

ACADEMIE DE MONTPELLIER

UNIVERSITE DES SCIENCES ET TECHNIQUES DU LANGUEDOC
(MONTPELLIER II)

T H E S E

présentée à l'Université des Sciences et Techniques du Languedoc
pour obtenir le grade de Docteur ès Sciences (**SCIENCES NATURELLES**)

HISTOGENESE DU SYSTEME NERVEUX CENTRAL CHEZ LE RAT.

Etudes chronoarchitectoniques par radioautographie quantitative.

par

Jean - Claude BISCONTE

Soutenue le 20 Janvier 1973 devant la Commission d'Examen.

JURY :	M. R. MARTY, Professeur à l'Université Montpellier II	Président
	M. B. DROZ, Professeur à l'Université Paris VI	} Examineurs
	M. I. ASSENMACHER, Professeur à l'Université Montpellier II	
	M. R. MARIGNAN, Professeur à l'Université Montpellier I	



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P R E A M B U L E

Dans cette seconde partie sont réunis des résultats dont l'articulation logique sous forme d'Atlas rendait difficile toute incorporation progressive dans le texte.

La solution que nous avons choisie en les réunissant avec la bibliographie dans un recueil hors-texte est destinée à alléger le volume principal mais surtout à permettre de s'y référer plus commodément en cours de lecture du texte.

S O M M A I R E

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LEGENDES DES PLANCHES

A/- PL 1 à PL 42 : RESULTATS RADIOAUTOGRAPHIQUES après marquage prénatal à la thymidine ^{14}C .

Pour l'ensemble de ces résultats la thymidine ^{14}C a été injectée prénatalement en une dose unique de 150 μCi environ (0,5 $\mu\text{Ci/g}$ corporel).

Les émulsions radioautographiques diffèrent selon l'objectif poursuivi. Pour les analyses quantitatives par photométrie le KODIREX sous forme de grandes plaques a été choisi afin de traiter d'une façon homogène le maximum de coupes histologiques. A partir des radioautographies ainsi obtenues (PL 1 et PL 2 en sont des exemples à un même niveau transversal) la photométrie a permis de préciser la séquence corticale (cf. 1^{ère} partie et Pl. IV D) et l'importance du gradient caudo-rostral (cf. 1^{ère} partie et Pl. IV F et Pl. IV G). Cependant dans la majorité des cas c'est l'émulsion ILFORD à grains fins G5 couchée sur plaque, qui a été utilisée. Si le contraste obtenu est plus faible, un bien meilleur rendu des détails compense largement cet inconvénient à nos yeux (PL 3 à PL 42). Les temps de pose sont dans l'ensemble de l'ordre d'un mois.

1- PL 1 à PL 20 : Nouveau-nés

a/ PL 1 à PL 2 : Evolution du marquage à un même niveau

Radioautographies extraites des séries quantitatives (émulsion KODIREX). Niveau transversal choisi : plan thalamique médian. On notera la progression ventro-dorsale du noircissement et la précocité du marquage dans le télencéphale amygdalien ; on peut observer le gradient très particulier dans le diencéphale dorsal avec, dans une première phase, la constitution d'une enveloppe marquée qui correspond au thalamus ventral, aux noyaux réticulaires, et à l'épithalamus latéral (12,5 j) ; puis ultérieurement la progression du marquage en direction centrale (cf. 13,5 j ; 14,5 j ; 15,5 j). Lorsque les dates d'injection sont

plus tardives on constate l'augmentation d'un marquage de fond qui ôte tout intérêt aux radioautographies au-delà du stade 17,5 ; il correspond aux neurones qui n'ont pas encore atteint leur destination définitive mais surtout à l'apparition des cellules gliales (cf. 1^è partie, Pl. IV H).

b/ PL 3 à PL 20 : Evolution du marquage selon les niveaux

Les 9 stades (de 10,5 j à 18,5 j) sont comparés selon 12 niveaux transversaux homologues des plans analytiques choisis chez l'adulte. (Atlas du cerveau de Rat nouveau-né, SHERWOOD et TIMIRAS, 1970). Pour les mêmes raisons que précédemment les stades 19,5 j et 20,5 j n'ont pas été représentés.

2- PL 21 à PL 42 : Adultes

Correspondance entre les 12 plans transversaux et les atlas de KÖNIG et KLIPPEL (1963) et CRAIGIE (1963) :

Références des niveaux		Atlas König-Klippel	Atlas Craigie
Radioautographies	cartes	Plans antérieurs (A) Plans postérieurs (P) Plans latéraux (L) en μ m	références de l'atlas
1		A 12130	
2		A 10500	
3		A 9650	
4	IV	A 7190	
5	V	A 5780	
6	VI	A 3750	
7	VII	A 2790	
8	VIII	A 1950	
9	IX	A 1020	
10	X	P 100	
11			A 9
12			A 8
	H	L 740	

B/PL 43 à PL 87 : RESULTATS CARTOGRAPHIQUES obtenus chez l'adulte après marquage prénatal à la thymidine ^3H .

Cartographie par table traçante suivant la méthode X-Y (PL 56, 57, 58, 63, 66, 69, 70, 74) ou la méthode sur axe pour les autres (en général l'axe Y sauf PL 87).

Ces cartes n'ont pas été retouchées et sont figurées telles qu'elles se présentent après les opérations de photométrie et de cartographie. Certains points peu appuyés ont pu disparaître au cours des opérations de reproduction. Inversement lorsque leur densité est élevée et qu'ils sont alignés ils peuvent apparaître sous la forme d'un trait continu ou d'une plage sombre. Dans la plupart des cas seules les cellules les plus marquées sont cartographiées ce qui se traduit par un nombre peu élevé de points. Assez fréquemment le cortex n'a pas fait l'objet du scanning en raison de l'étude particulière qui lui a été consacrée par ailleurs (cf. 1^è partie).

C/PL 88 à PL 97 : CARTES CHRONOARCHITECTONIQUES.

Dans ces cartes de synthèse la partie droite de la planche est réservée à la nomenclature d'après KÖNIG et KLIPPEL (1963). Dans la moitié gauche, figurent en pointillés les bandes isochroniques. Chacune d'elles est caractérisée par un nombre qui correspond au stade contemporain de l'injection (en jours prénataux). Les limites structurales les mieux définies (commissures, corps calleux, pédoncules) sont en trait continu et les ventricules en noir.

Dans la plupart des cas un seul nombre figure dans les isochrones ; ceci signifie que ce sont les neurones contemporains de ce stade qui constituent la majorité des cellules contenues dans la bande isochronique. On remarquera par exemple que la couche isocorticale la plus superficielle est marquée

18,5 ce qui traduit le fait que la majorité des neurones contenus dans cette limite sont différenciés à 18,5 jours, le restant étant produit à 19,5 et 20,5 j (cf. Résultats, première partie).

II - INDEX DES ABREVIATIONS

Les abréviations employées (PL 43 à PL 88) sont extraites de l'atlas du cerveau de Rat de KONIG et KLIPPEL (1963).

AA	Area amygdala anterior
AC	Aqueductus cerebri (Sylvii)
ACU	Area cuneiformis
APM	Area pretectalis medialis
AVT	Area ventralis tegmenti (Tsai)
BCI	Brachium colliculi inferioris
C	Cingulum
CA	Commissura anterior
CAA	Commissura anterior, pars anterior
CAI	Capsula interna
CAIR	Capsula interna, pars retrolenticularis
CAP	Commissura anterior, pars posterior
CC	Crus cerebri
CCS	Commissura colliculorum superiorum
CE	Cortex entorhinalis
CFD	Commissura forniciis dorsalis (Commissura hippocampi dorsalis)
CFV	Commissura forniciis ventralis (Commissura hippocampi ventralis)
CI	Colliculus inferior
CL	Clastrum
CO	Chiasma opticum
CP	Commissura posterior
CPF	Cortex piriformis

F	Columna fornicis
FH	Fimbria hippocampi
FL	Fasciculus longitudinalis
FLM	Fasciculus longitudinalis medialis
FMP	Fasciculus medialis prosencephali
FMT	Fasciculus mamilothalamicus
FOP	Fasciculus opticus
FOR	Formatio reticularis
FPT	Fibrae pontis transversae
FR	Fasciculus retroflexus
GCC	Genu corporis callosi
GD	Gyrus dentatus
GP	Globus pallidus
H	Habenula
HI	Hippocampus
IC	Insulae Calleja
ICM	Insula Calleja magna
LCM	Lamina cellularum mitralium bulbi olfactorii
LG	Lamina glomerulosa bulbi olfactorii
LGE	Lamina granularis externa bulbi olfactorii
LGI	Lamina granularis interna bulbi olfactorii
LM	Lemniscus medialis
LMO	Lamina molecularis bulbi olfactorii
LMIO	Lamina medullaris interna bulbi olfactorii
LPIB	Lamina plexiformis interna bulbi olfactorii
LT	Lemniscus trigeminalis
MI	Massa intercalata
OS	Organon subfornicale

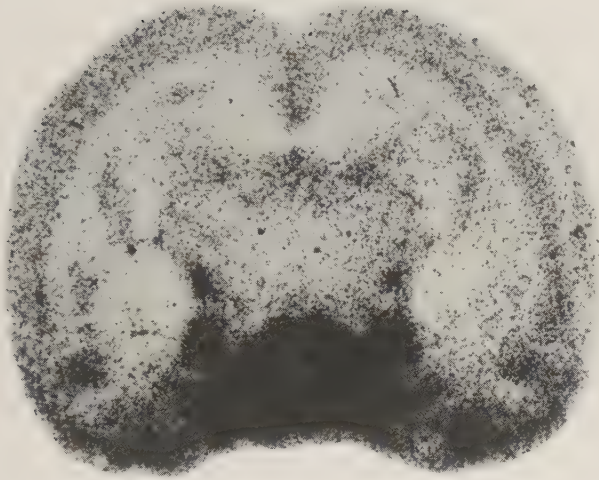
PCM	Pedunculus cerebellaris medius
PCMA	Pedunculus corporis mamillaris
PCS	Pedunculus cerebellaris superior
PF	Polus frontalis
R	Raphe
RCC	Radiatio corporis callosi
RTS	Radiatio thalami superior
S	Subiculum
SAM	Stratum album mediale colliculi superioris
SAP	Stratum album profundum colliculi superioris
SGCD	Substantia grisea centralis, pars dorsalis
SGCL	Substantia grisea centralis, pars lateralis
SGCV	Substantia grisea centralis, pars ventralis
SGM	Stratum griseum mediale colliculi superioris
SGP	Stratum griseum profundum colliculi superioris
SGS	Stratum griseum superficiale colliculi superioris
SM	Stria medullaris thalami
SNL	Substantia nigra, pars lateralis
SNR	Substantia nigra, zona reticulata
SO	Stratum opticum colliculi superioris
SPCC	Splenium corporis callosi
ST	Stria terminalis
STC	Stria terminalis, pars commissuralis
STH	Stria terminalis, pars hypothalamica
TCC	Truncus corporis callosi
TCL	Tractus corticohypothalamicus lateralis
TD	Tractus diagonalis (Broca)
TO	Tractus opticus
TOL	Tractus olfactorius lateralis
TRS	Tractus rubrospinalis
TSHT	Tractus septohypothalamicus
TSTH	Tractus striohypothalamicus
TULC	Tuberculum olfactorium, pars corticalis, lamina pyramidalis

TULP	Tuberculum olfactorium, pars corticalis, lamina plexiformis
TULI	Tuberculum olfactorium, pars interna, lamina polymorphica
VL	Ventriculus lateralis
VO	Ventriculus olfactorius
V III	Ventriculus tertius
ZI	Zona incerta
a	Nucleus accumbens
abl	Nucleus amygdaloideus basalis, pars lateralis
abm	Nucleus amygdaloideus basalis, pars medialis
ac	Nucleus amygdaloideus centralis
aco	Nucleus amygdaloideus corticalis
ala	Nucleus amygdaloideus lateralis, pars anterior
alp	Nucleus amygdaloideus lateralis, pars posterior
am	Nucleus amygdaloideus medialis
ar	Nucleus arcuatus
ca	Nucleus commissurae anterioris
cgm	Nucleus centralis corporis geniculati medialis
cp	Nucleus caudatus putamen
ct	Nucleus corporis trapezoidei
d	Nucleus Darkschewitsch
dcgl	Nucleus dorsalis corporis geniculati lateralis
dr	Nucleus dorsalis raphes
fm	Nucleus paraventricularis (filiformis), pars magnocellularis
fp	Nucleus paraventricularis (filiformis), pars parvocellularis
g	Nucleus gelatinosus

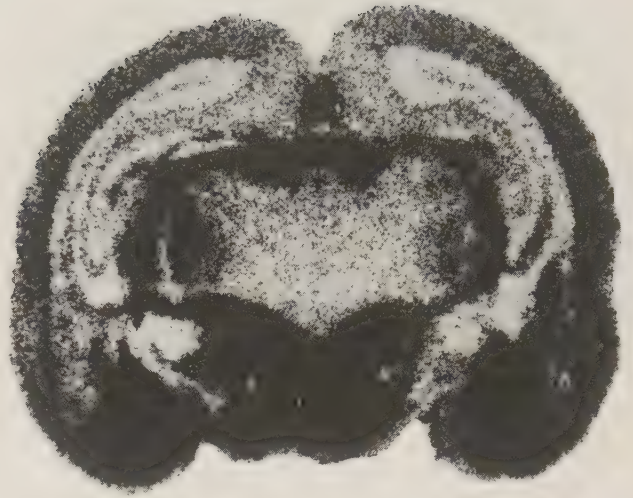
ha	Nucleus anterior (hypothalami)
hdd	Nucleus dorsomedialis (hypothalami), pars dorsalis
hdv	Nucleus dorsomedialis (hypothalami), pars ventralis
hl	Nucleus lateralis (hypothalami)
hp	Nucleus posterior (hypothalami)
hpv	Nucleus periventricularis (hypothalami)
hvmc	Nucleus ventromedialis (hypothalami) par centralis
hvmm	Nucleus ventromedialis (hypothalami) par medialis
i	Nucleus interstitialis (Cajal)
icp	Nucleus intracommissuralis commissurae posterioris
idtv	Nucleus interstitialis decussationis tegmenti ventralis
imcp	Nucleus interstitialis magnocellularis commissurae posterioris
ip	Nucleus interpeduncularis
lc	Nucleus linearis, pars caudalis
lh	Nucleus habenulae lateralis
mcgm	Nucleus marginalis corporis geniculati medialis
mh	Nucleus medialis habenulae
ml	Nucleus mamillaris lateralis
mm1	Nucleus mamillaris medialis, pars lateralis
mmm	Nucleus mamillaris medialis, pars medialis
mp	Nucleus mamillaris posterior
mr	Nucleus medianus raphes
oad	Nucleus olfactorius anterior, pars dorsalis
oae	Nucleus olfactorius anterior, pars externa
oal	Nucleus olfactorius anterior, pars lateralis
oam	Nucleus olfactorius anterior, pars medialis
oap	Nucleus olfactorius anterior, pars posterior
ol	Nucleus tractus olfactorii lateralis
p	Nucleus pretectalis
pd	Nucleus premamillaris dorsalis
pf	Nucleus parafascicularis
pl	Nuclei pontis, pars lateralis

pm	Nuclei pontis, pars medialis
pol	Nucleus preopticus lateralis
pom	Nucleus preopticus medialis
poma	Nucleus preopticus magnocellularis
pome	Nucleus preopticus medianus
pop	Nucleus preopticus periventricularis
posc	Nucleus preopticus, pars suprachiasmatica
pp	Nucleus pretectalis profundus
pt	Nucleus paratenialis
pv	Nucleus premamillaris ventralis
pvr	Nucleus periventricularis rotundocellularis
pvs	Nucleus periventricularis stellatocellularis
r	Nucleus ruber
re	Nucleus reuniens
rh	Nucleus rhomboideus
s	Nucleus suprageniculatus
sc	Nucleus suprachiasmaticus
scp	Nucleus subcommissuralis commissurae posterioris
sf	Nucleus septalis fimbrialis
sl	Nucleus septi lateralis
sm	Nucleus septi medialis
so	Nucleus supraopticus
spf	Nucleus suprafascicularis
st	Nucleus interstitialis striae terminalis
sum	Nucleus supramamillaris
sut	Nucleus subthalamicus
tad	Nucleus anterior dorsalis thalami
tam	Nucleus anterior medialis thalami
tav	Nucleus anterior ventralis thalami
td	Nucleus tractus diagonalis (Broca)
tl	Nucleus lateralis thalami
tlp	Nucleus lateralis thalami, pars posterior

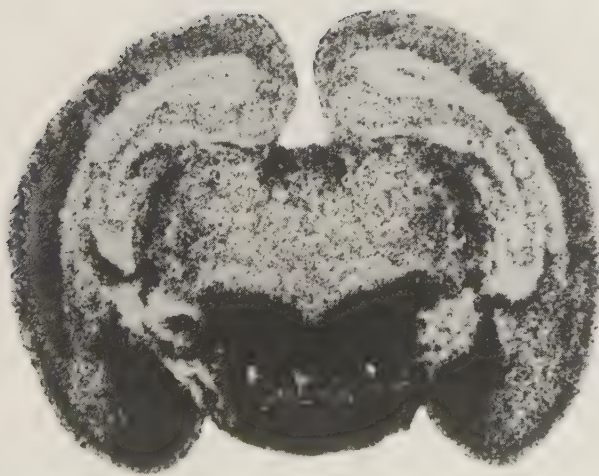
tm	Nucleus medialis thalami
tml	Nucleus medialis thalami, pars lateralis
tmm	Nucleus medialis thalami, pars medialis
tol	Nucleus tractus optici, pars lateralis
tom	Nucleus tractus optici, pars medialis
top	Nucleus tractus optici, pars posterior
tp	Nucleus tegmenti pontis
tpm	Nucleus posteromedianus thalami
tpo	Nucleus posterior thalami
tr	Nucleus reticularis thalami
ts	Nucleus triangularis septi
tv	Nucleus ventralis thalami
tdv	Nucleus ventralis thalami, pars dorso-medialis
tvm	Nucleus ventralis medialis thalami, pars magnocellularis
typ	Nucleus ventralis medialis thalami, pars parvocellularis
vcgl	Nucleus ventralis corporis geniculati lateralis
vc1l	Nucleus ventralis caudalis lemnisci lateralis
vr1l	Nucleus ventralis rostralis lemnisci lateralis
vt	Nucleus ventralis tegmenti.



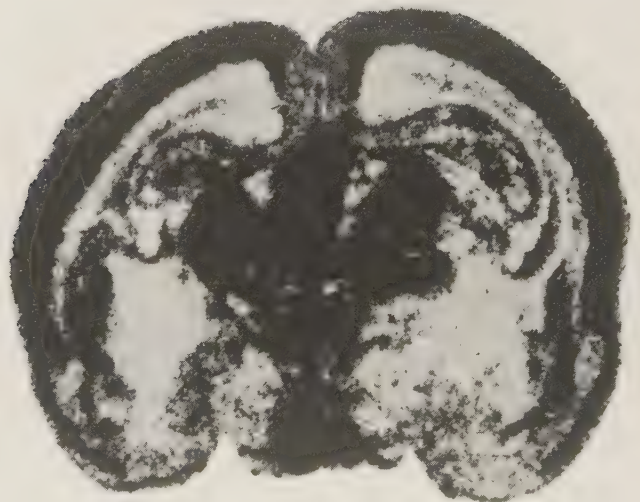
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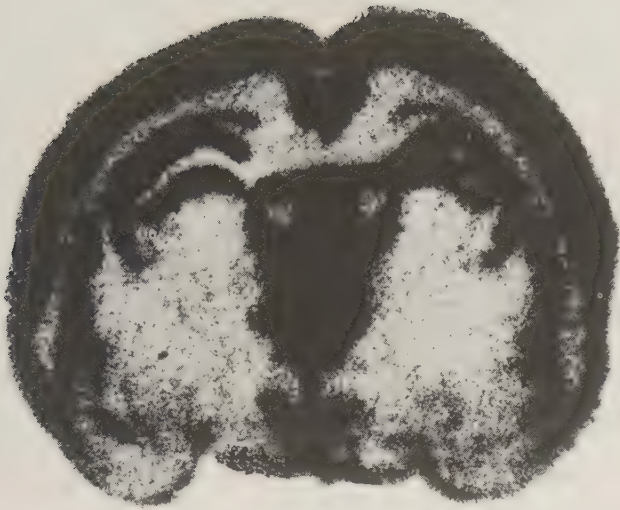
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INJECTION 13,5 JOURS



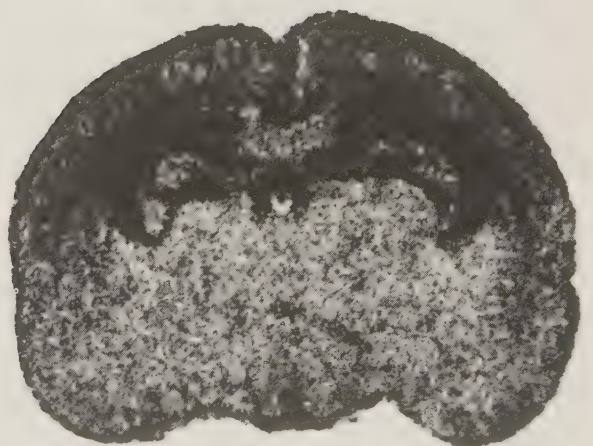
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INJECTION 16,5 JOURS



INJECTION 15,5 JOURS

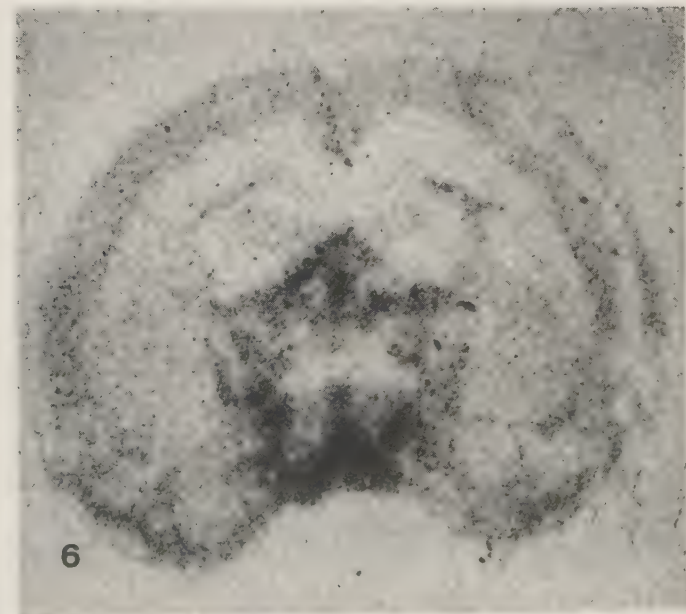
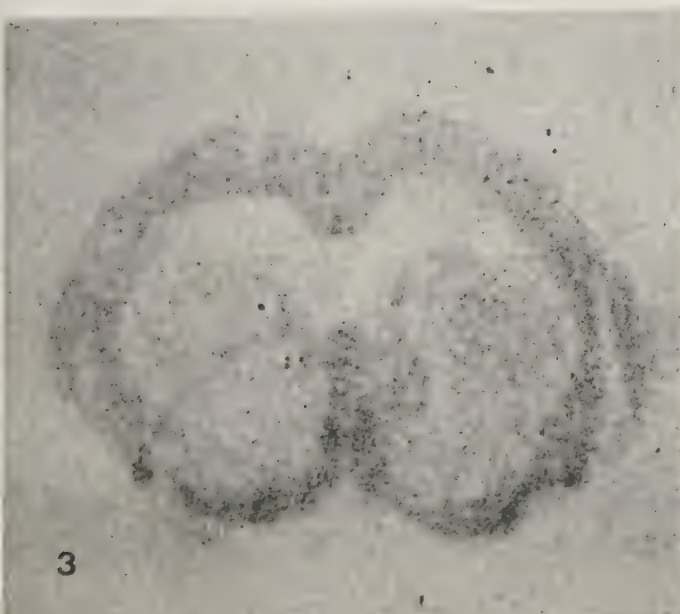
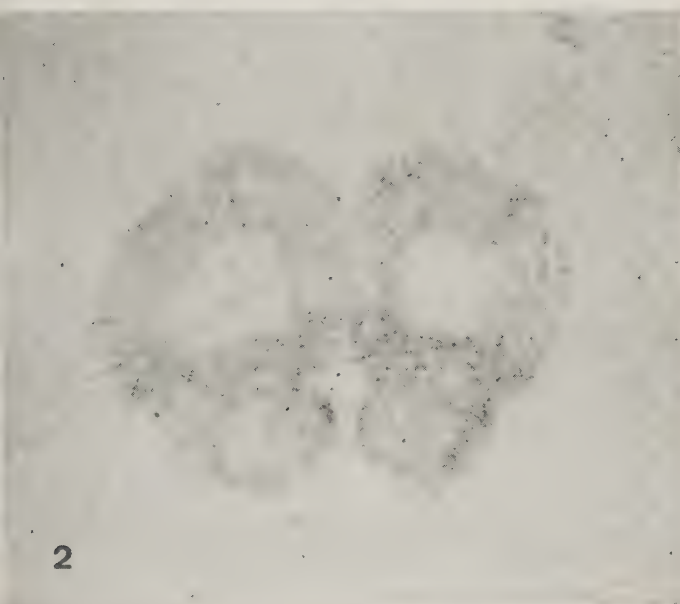


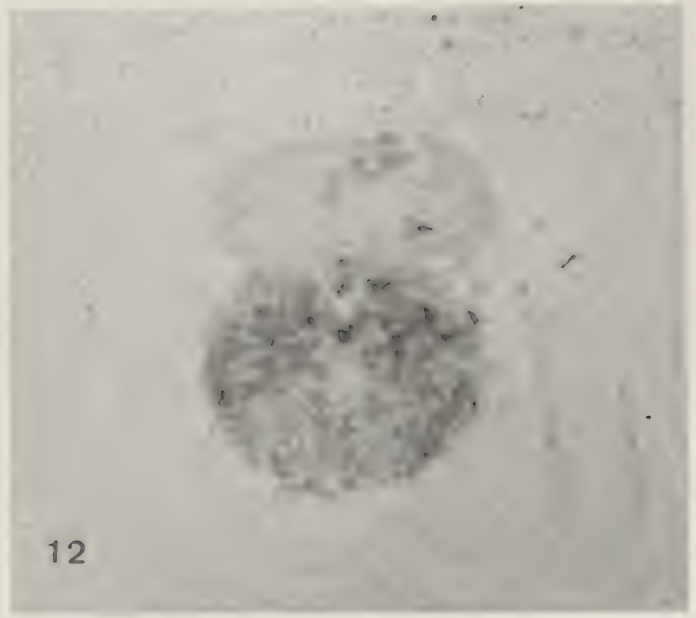
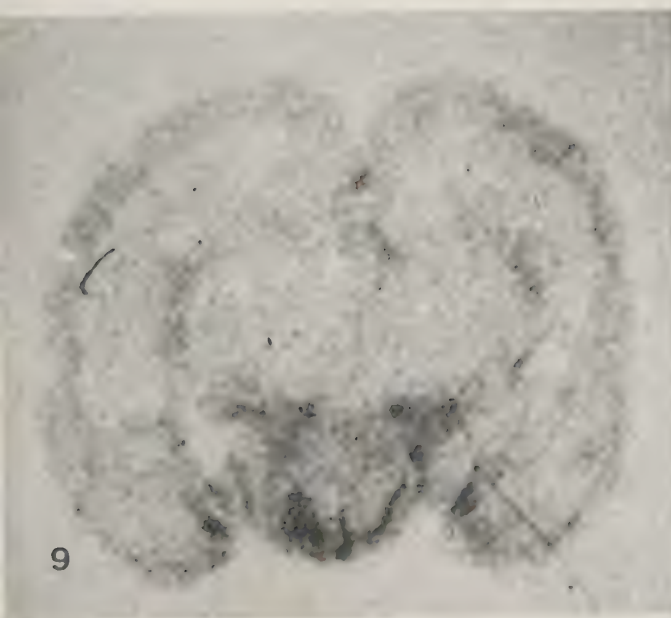
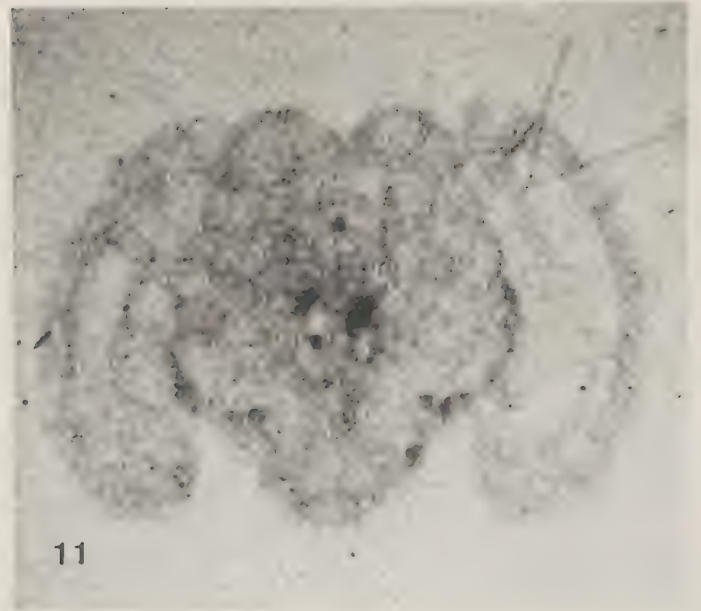
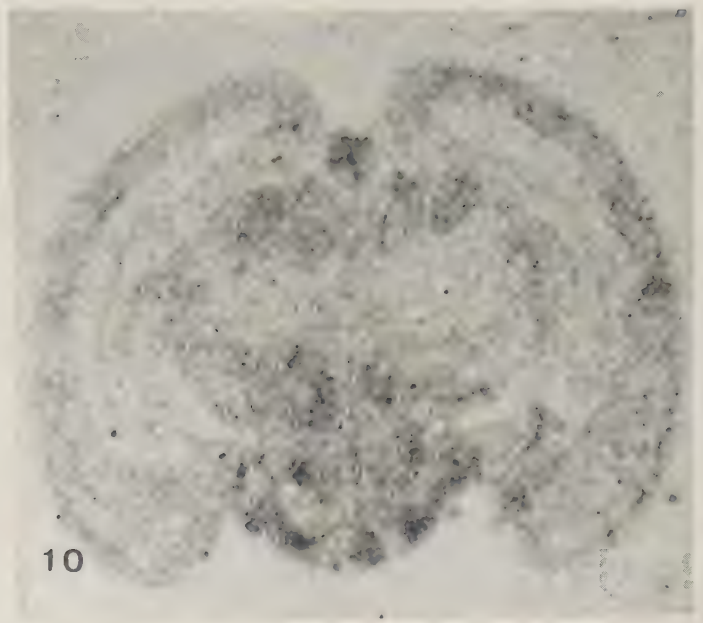
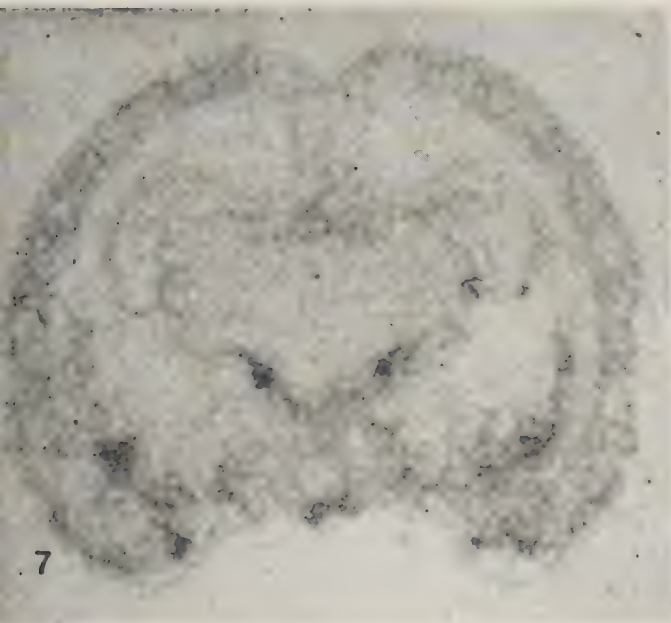
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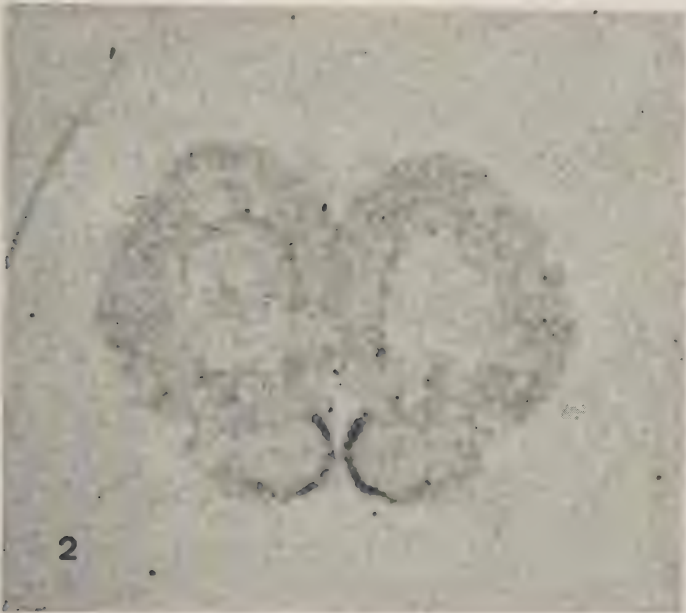
PL 3

NOUVEAUX-NES

INJECTION 10,5 JOURS



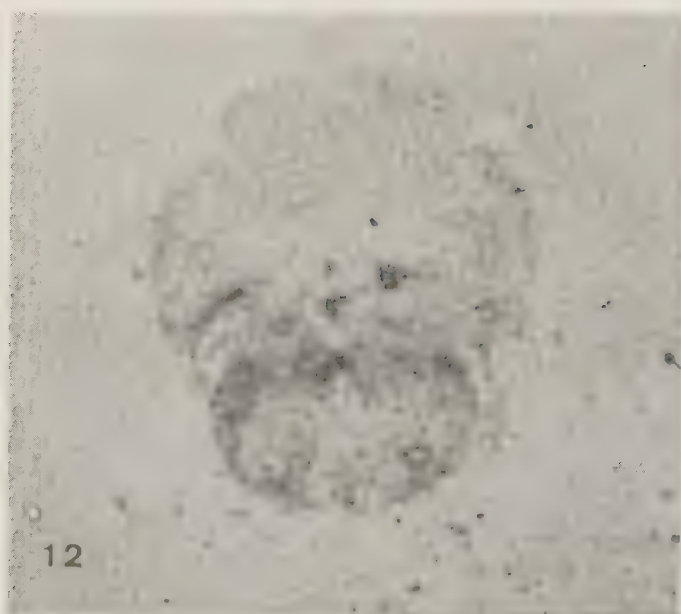
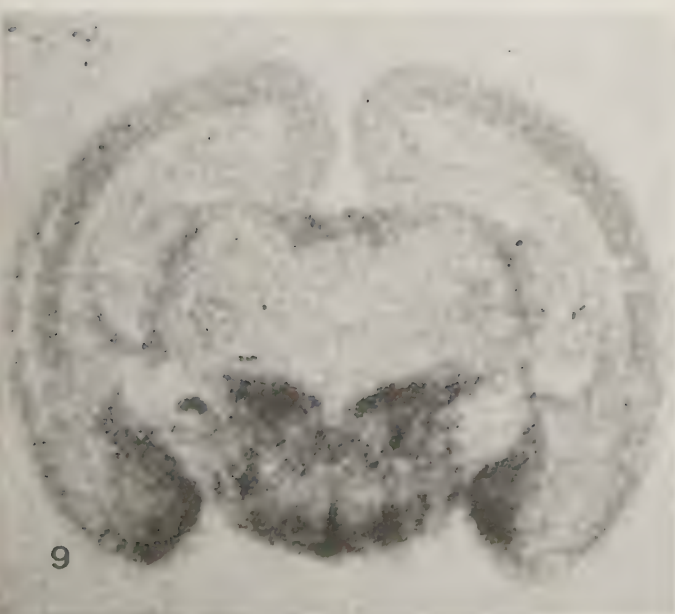
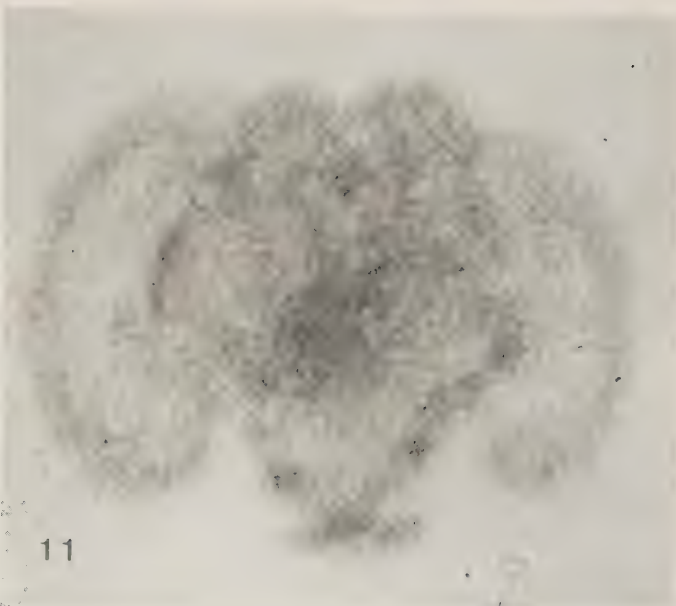
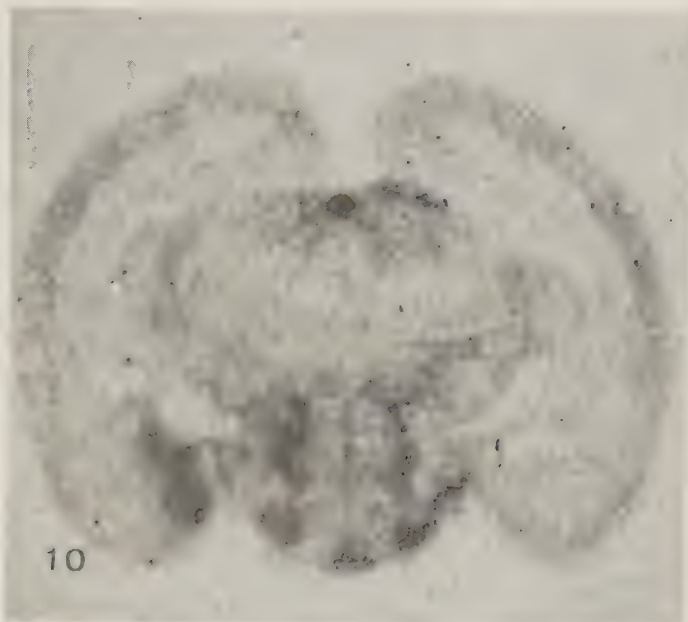


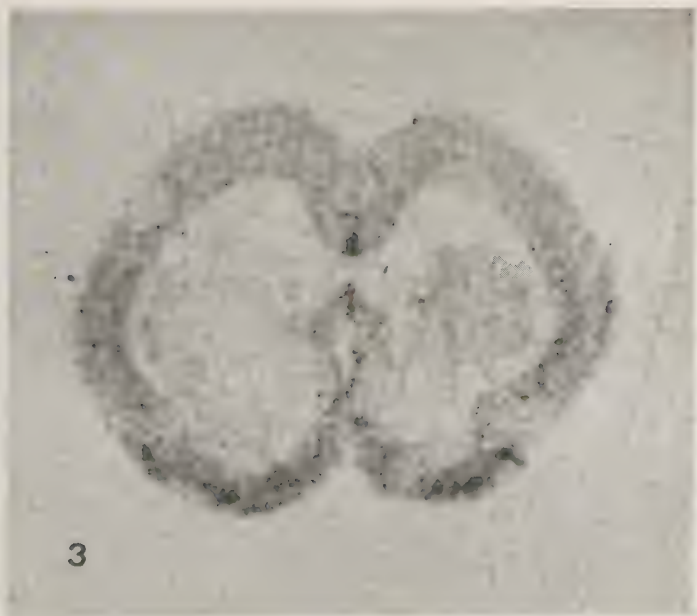
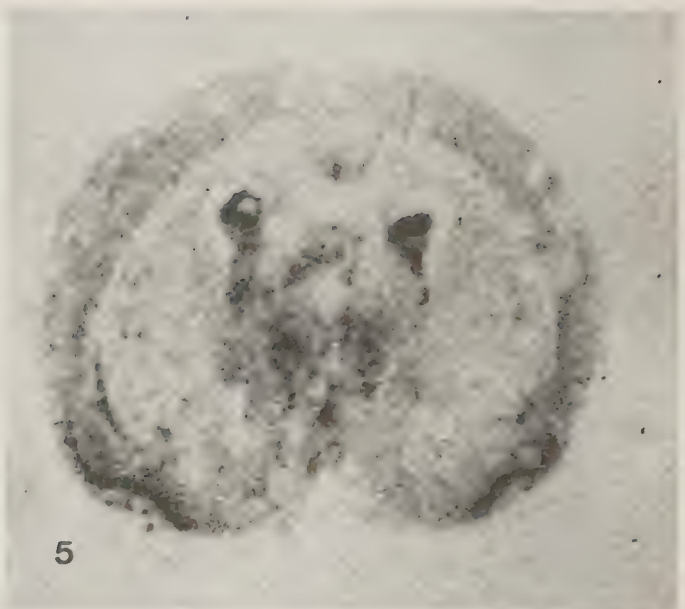
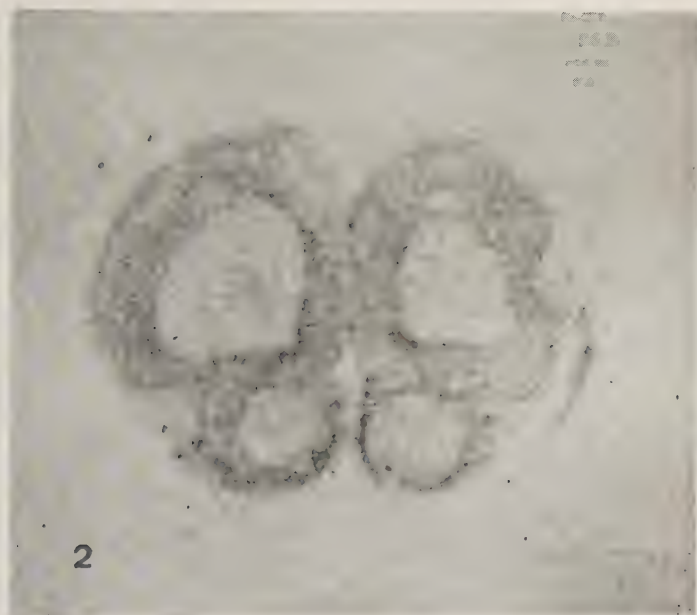
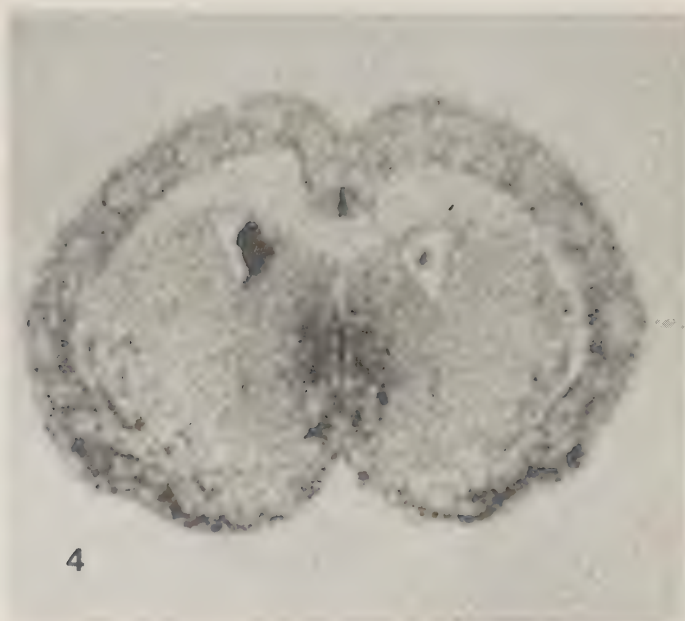


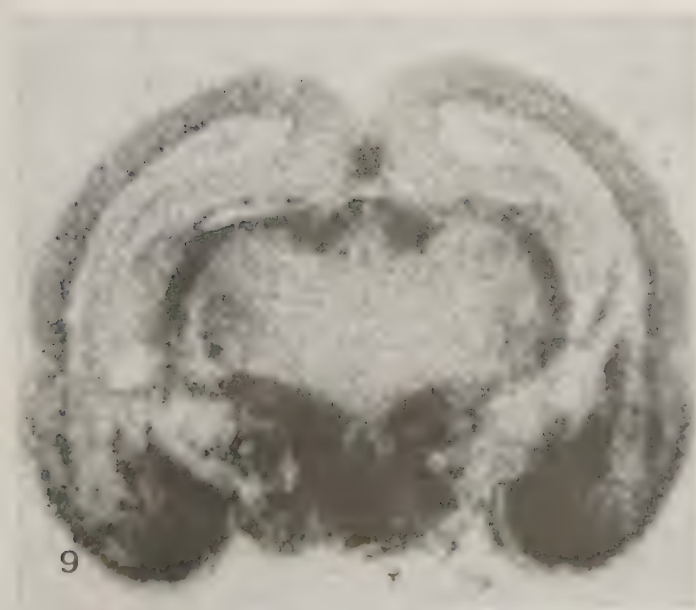
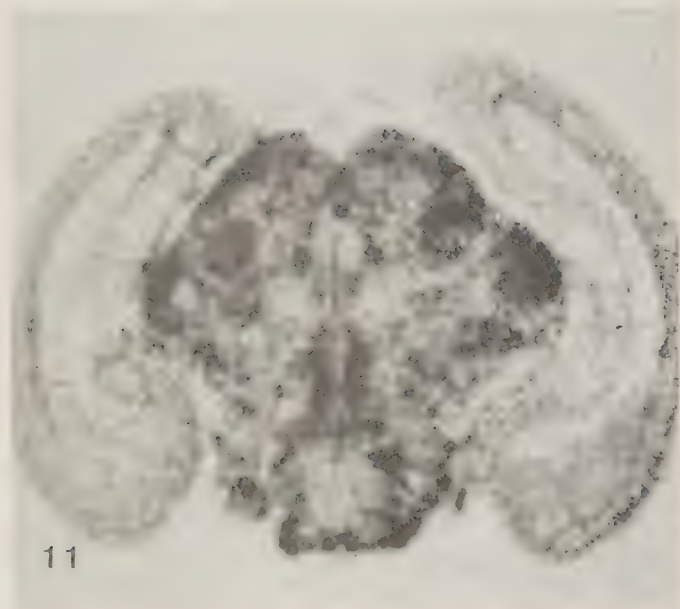
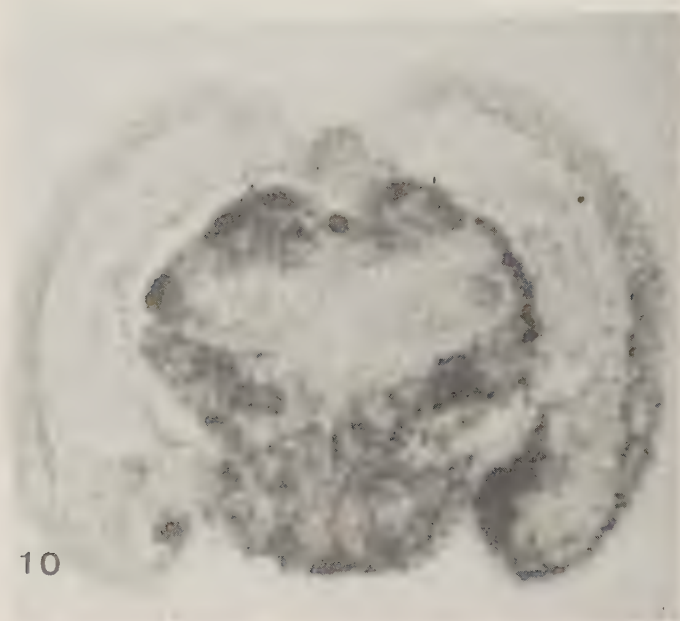
PL 6

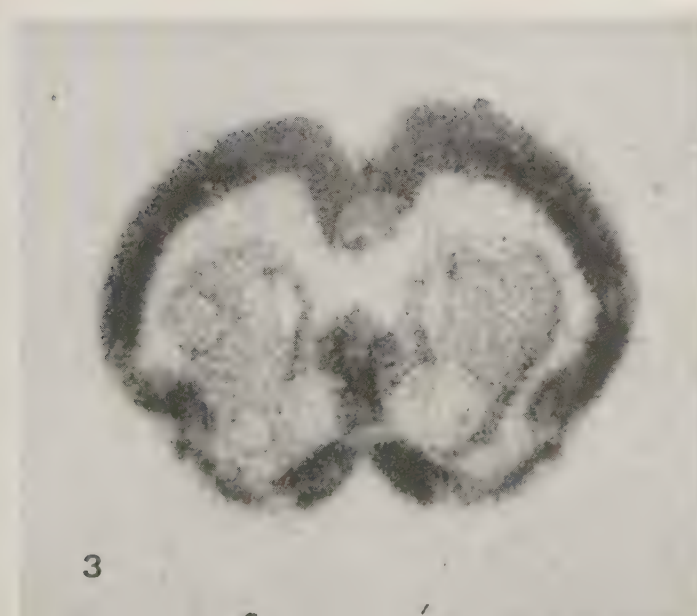
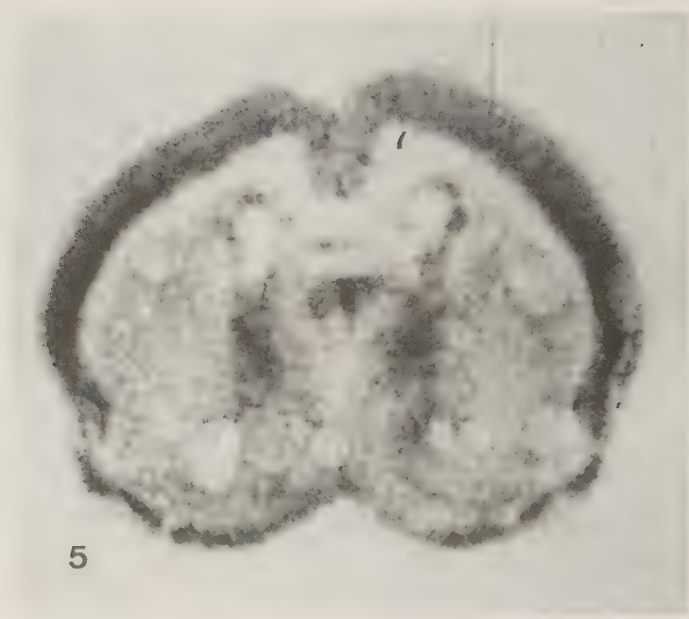
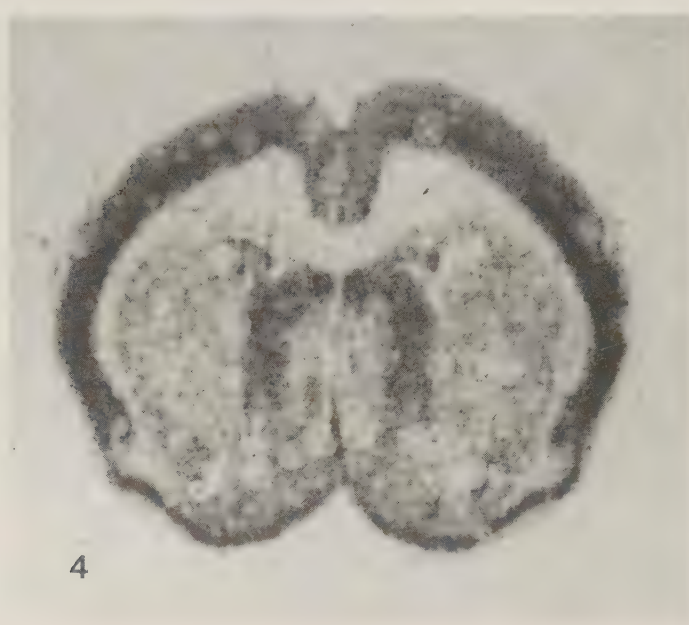
NOUVEAUX-NES

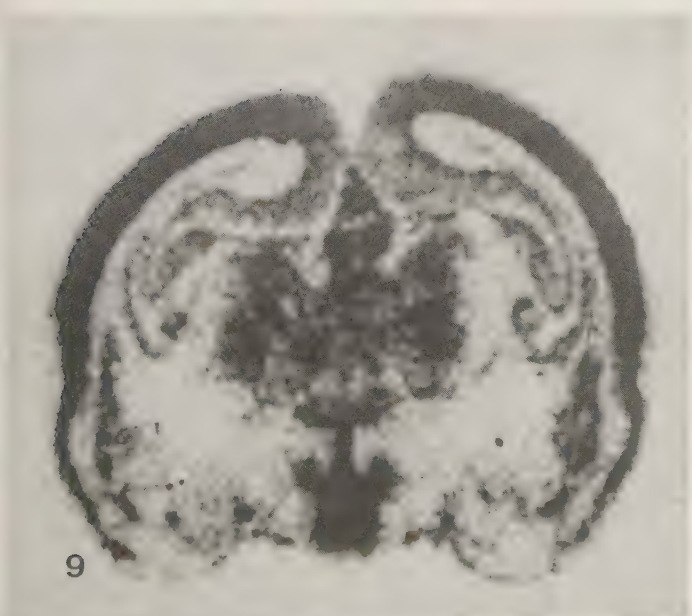
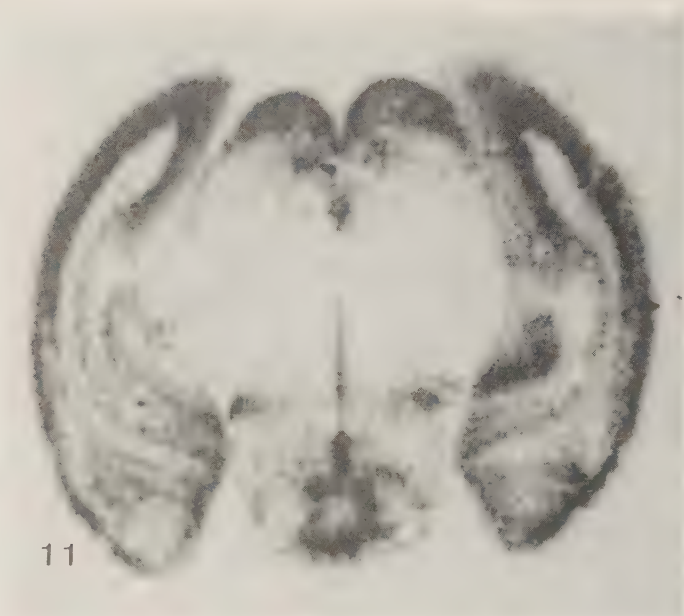
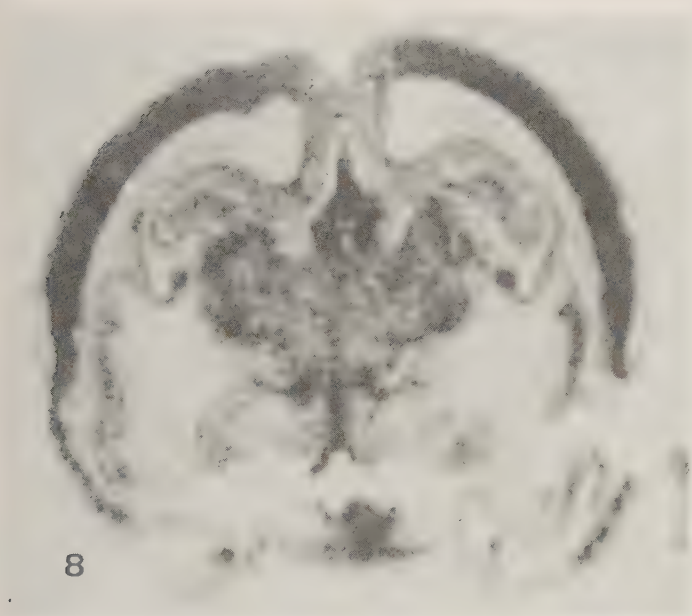
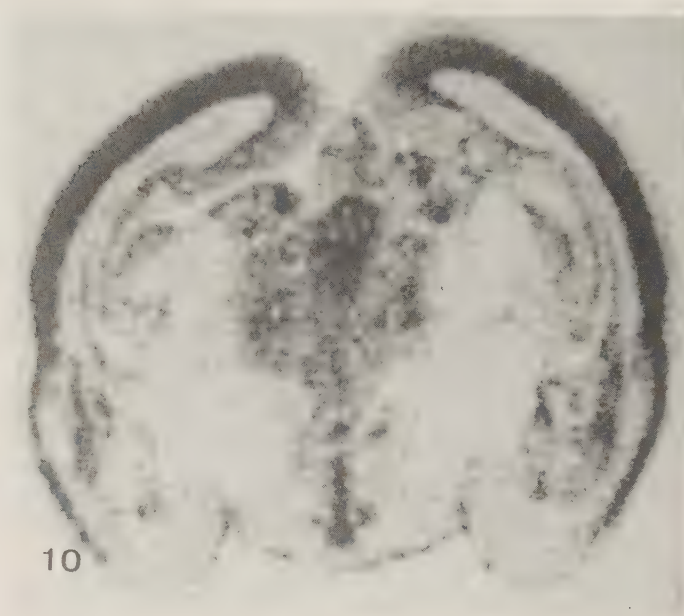
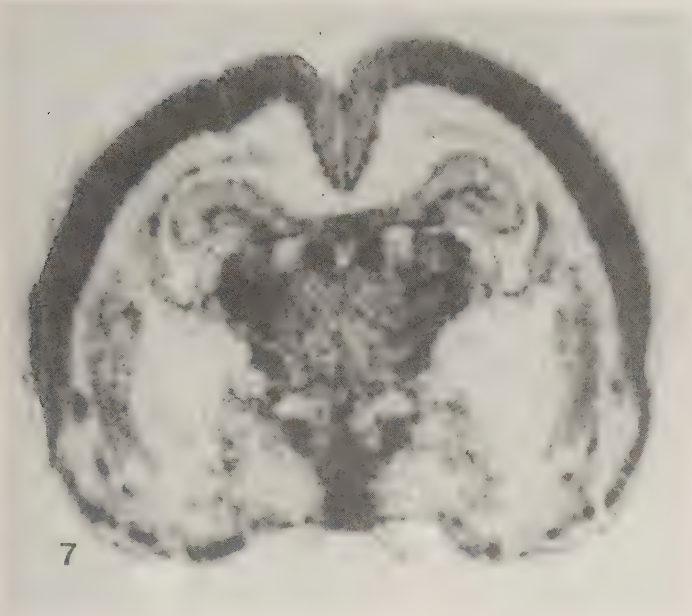
INJECTION 11,5 JOURS

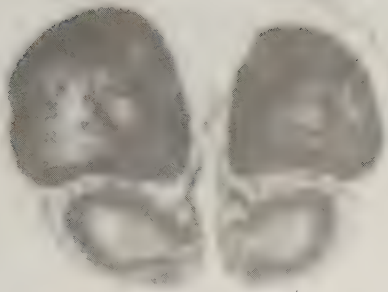








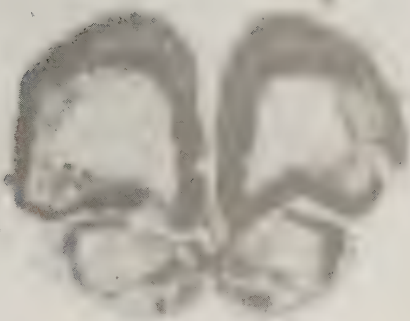




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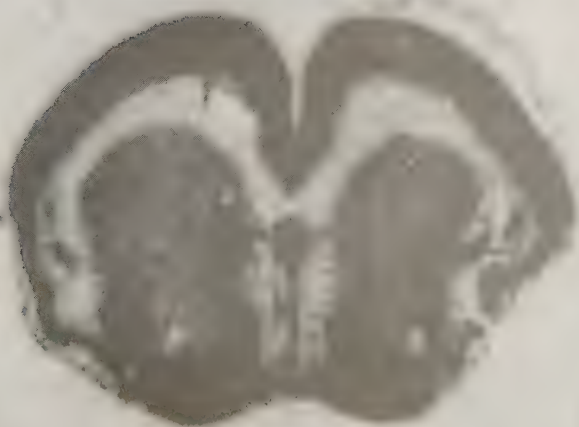
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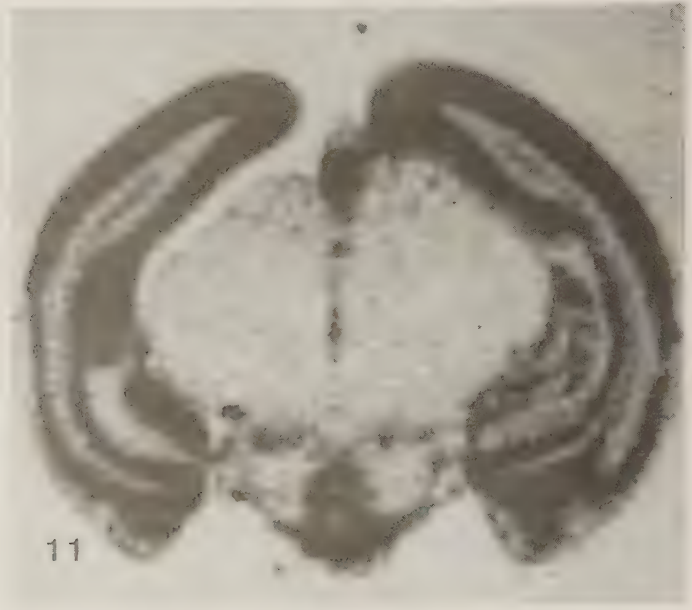
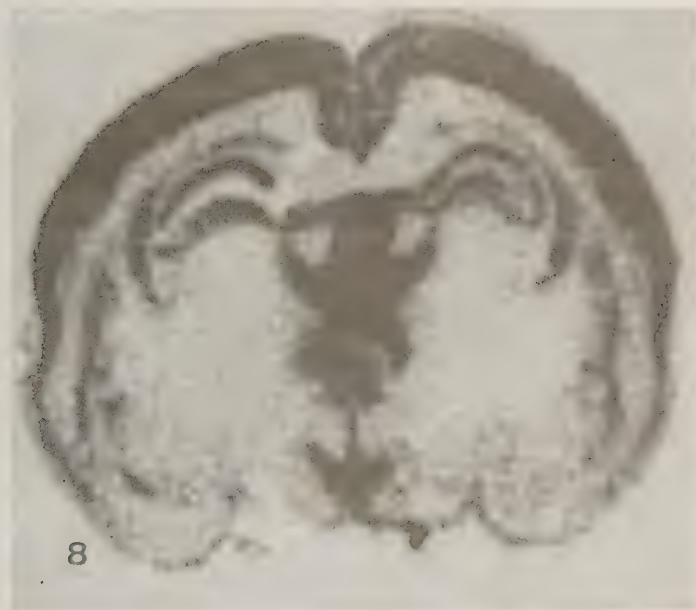
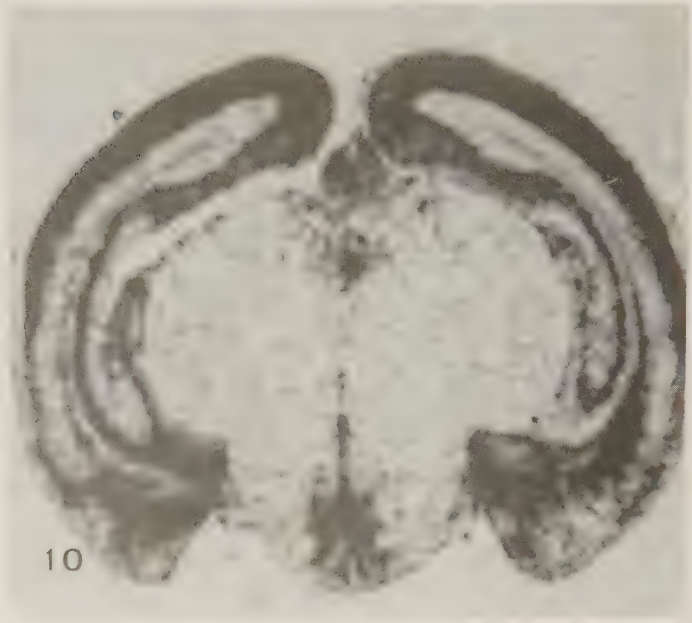
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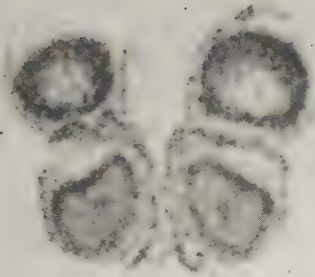


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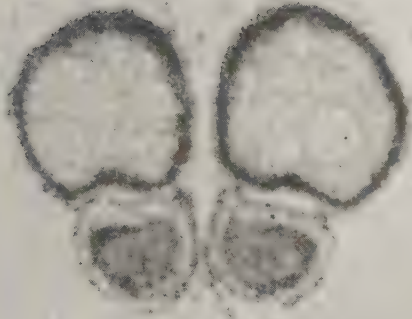




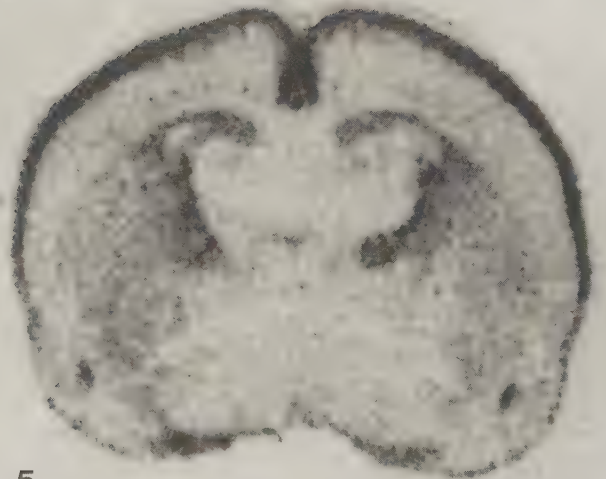
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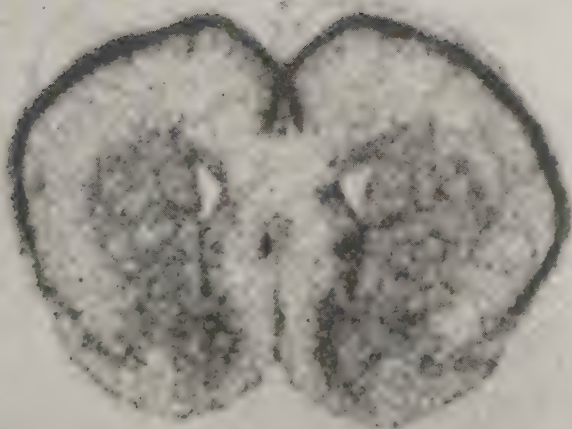
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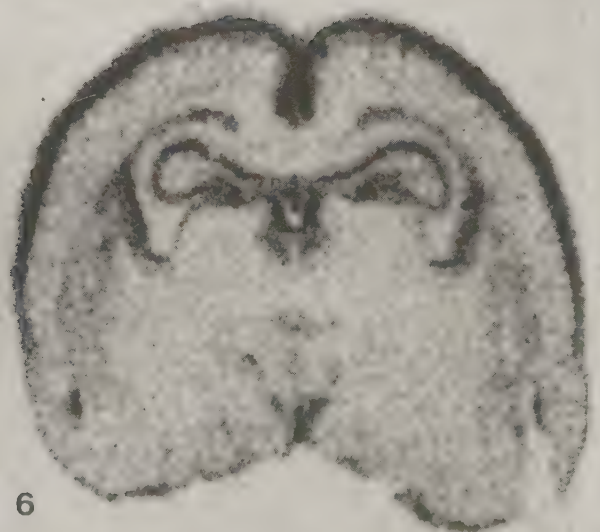
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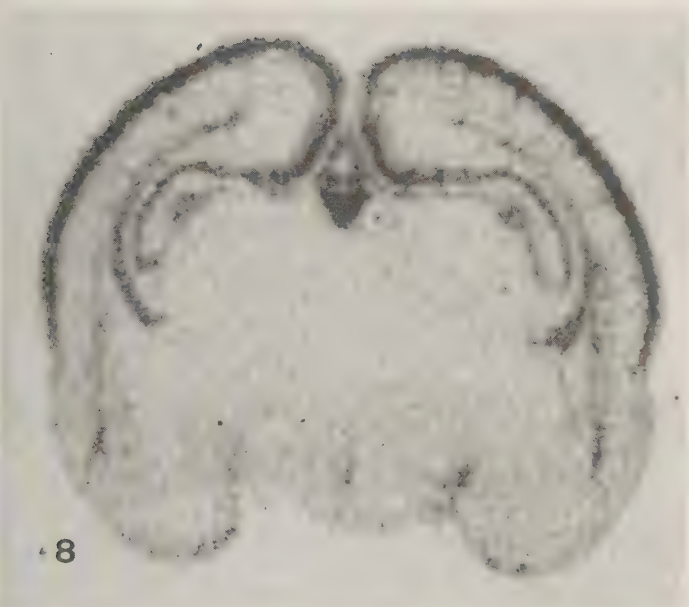
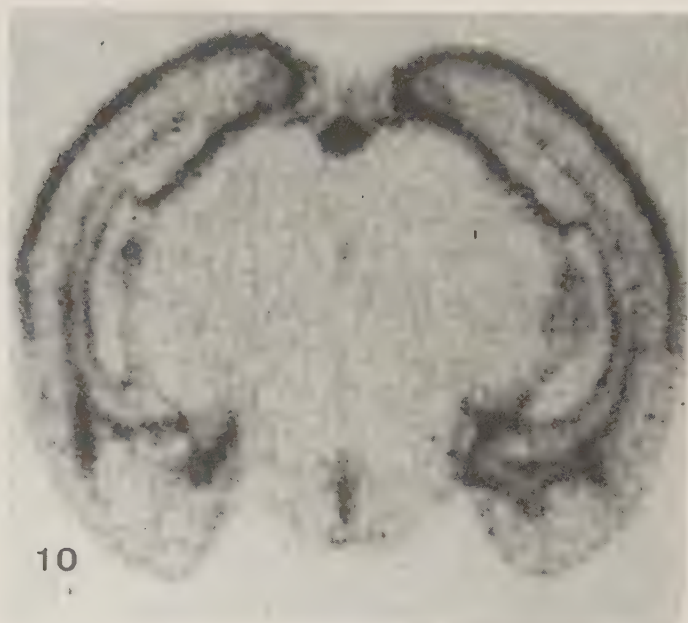
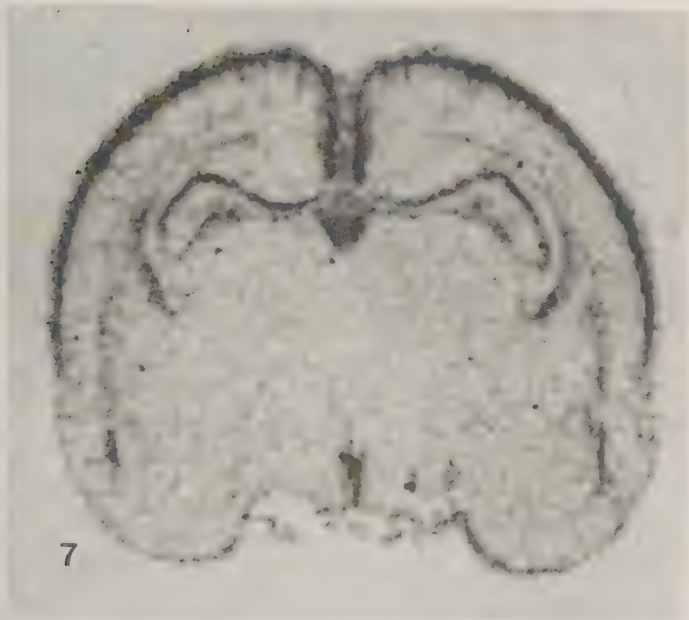
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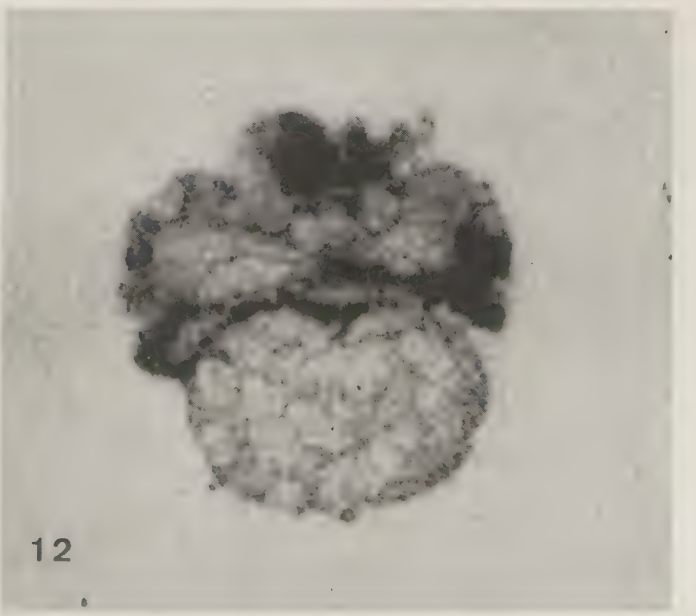
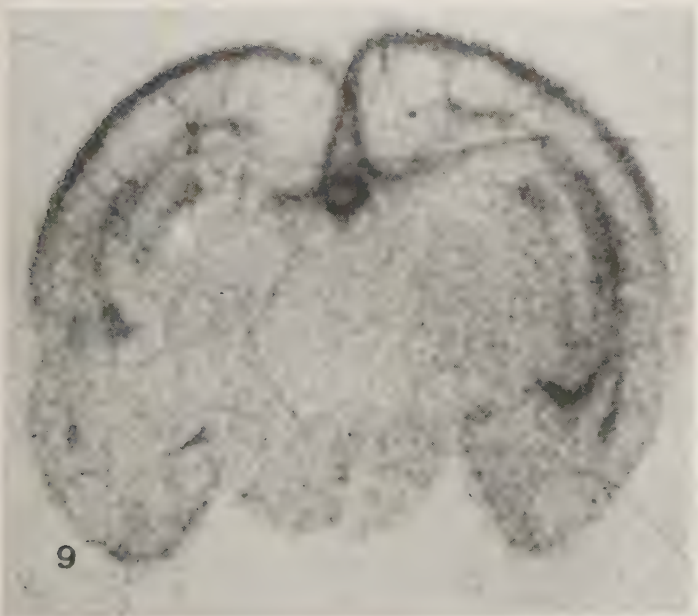
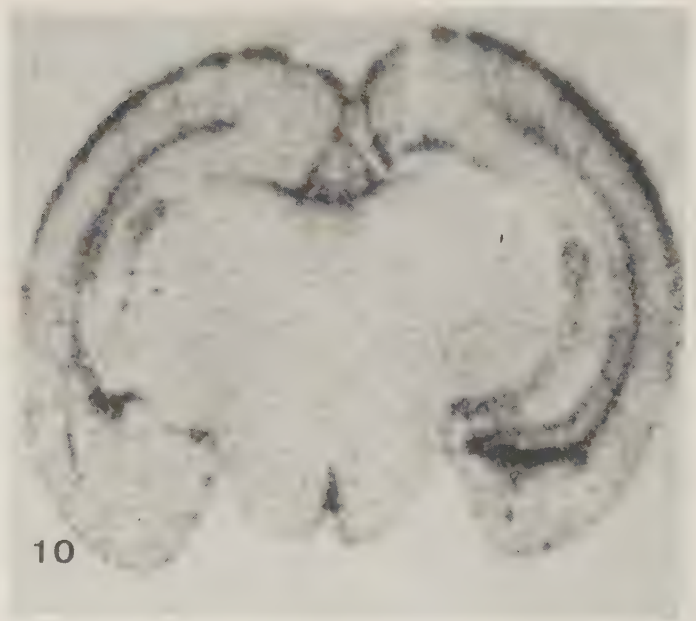
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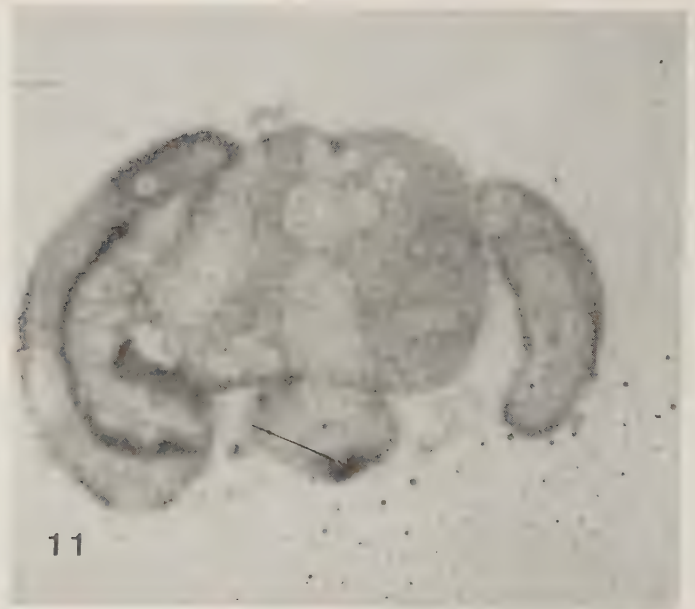
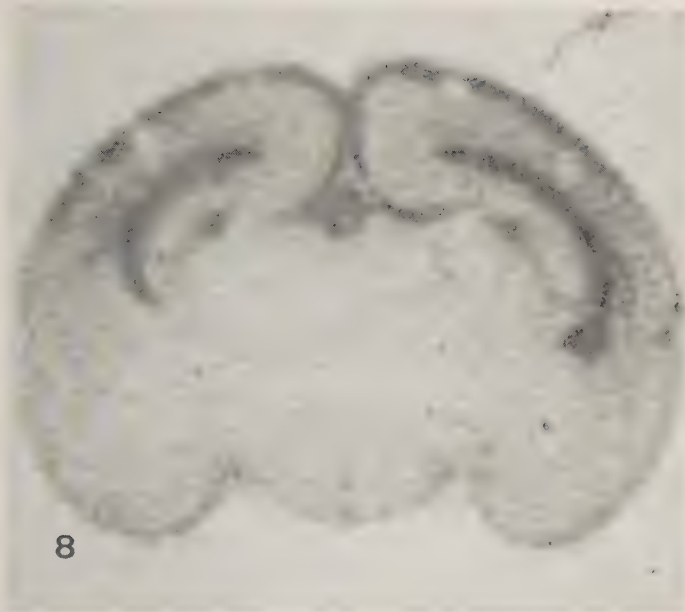
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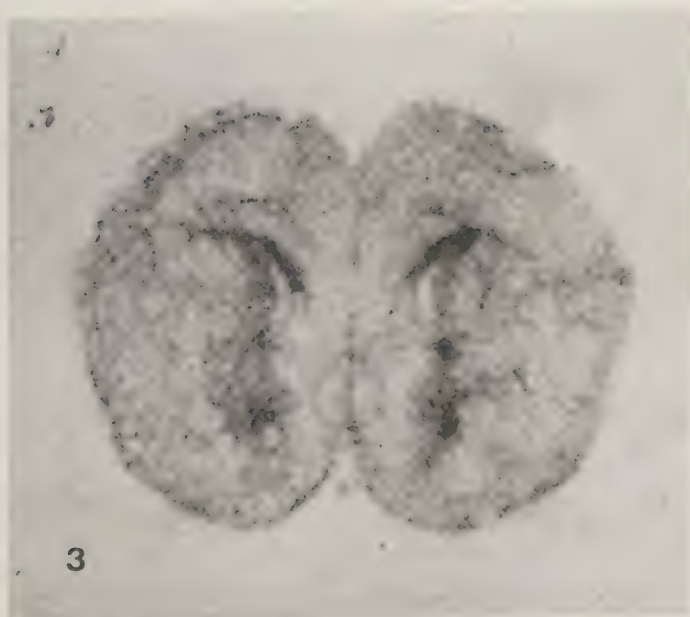
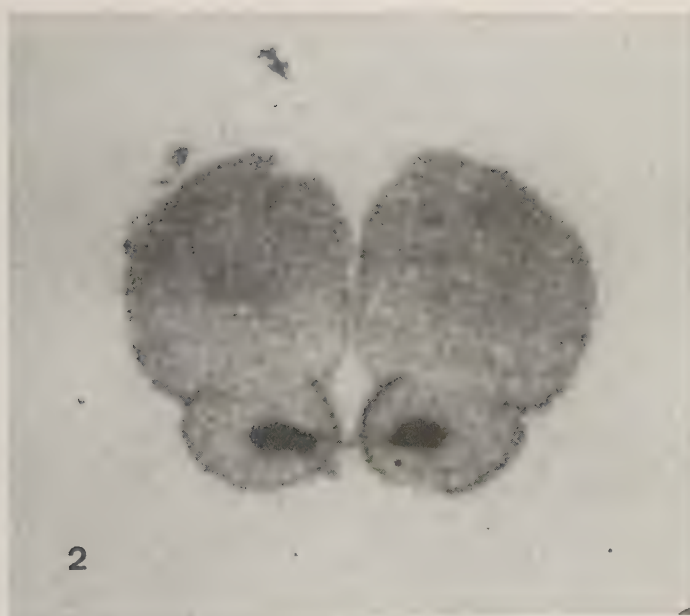
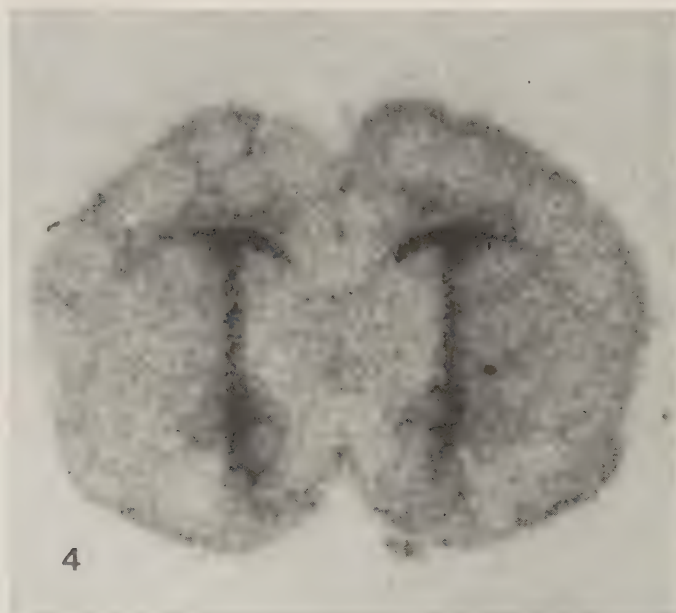
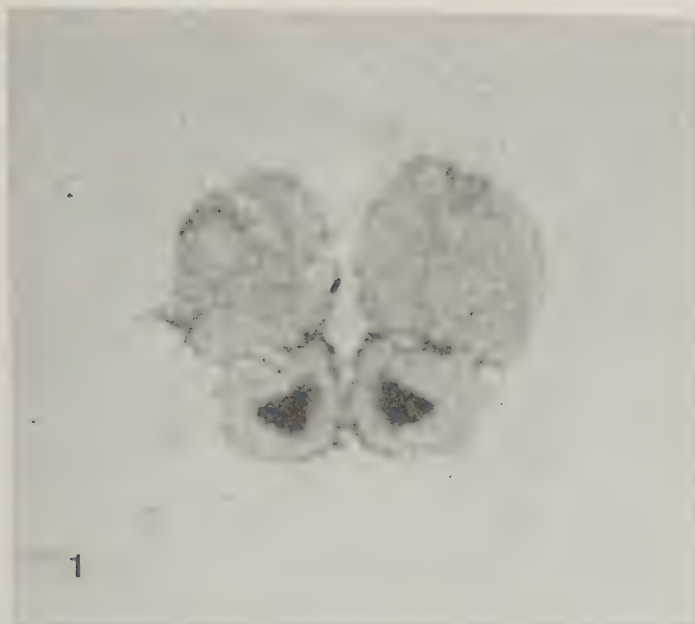


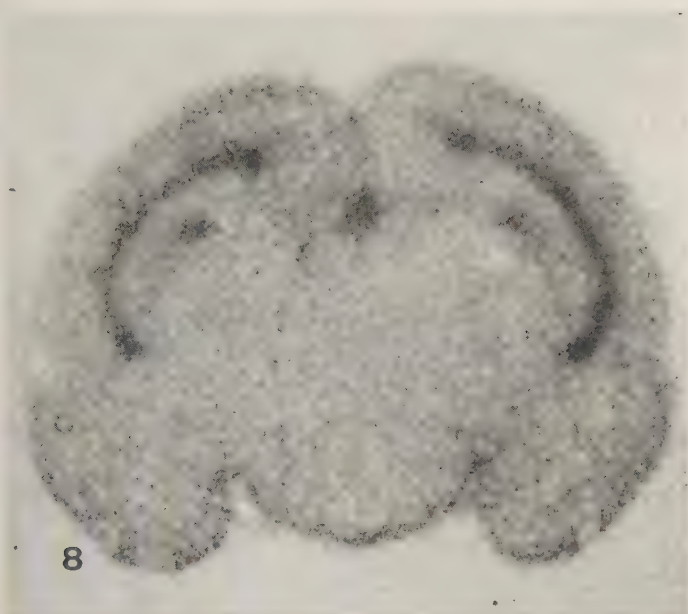
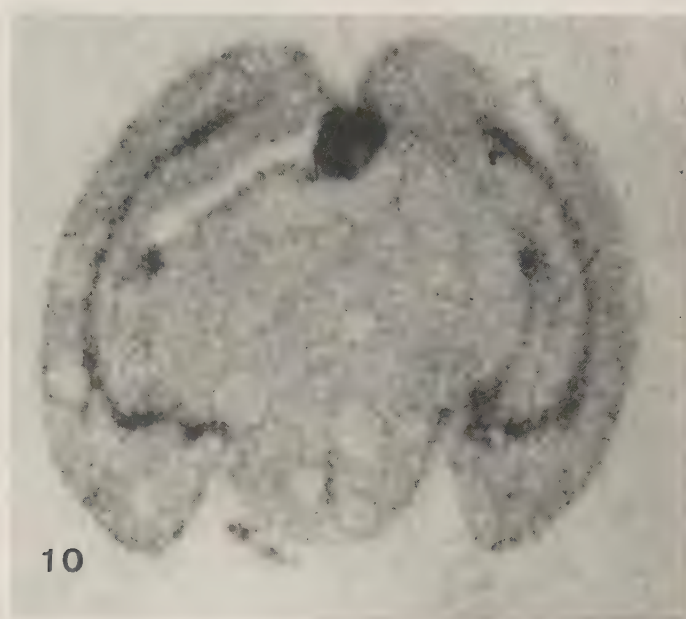






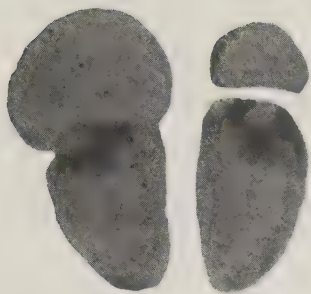




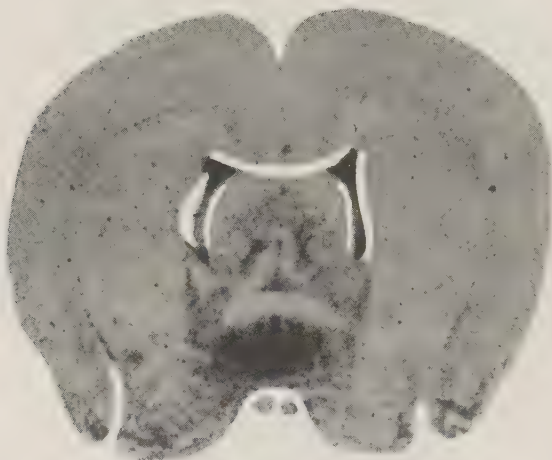


ADULTES

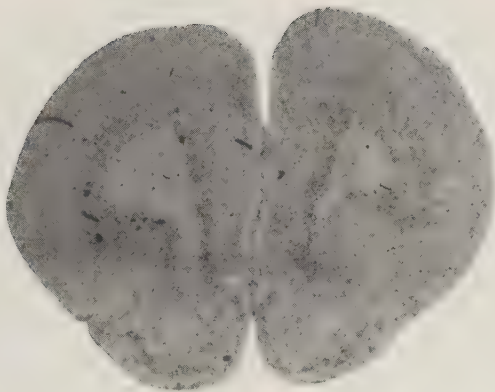
INJECTION 10,5 JOURS



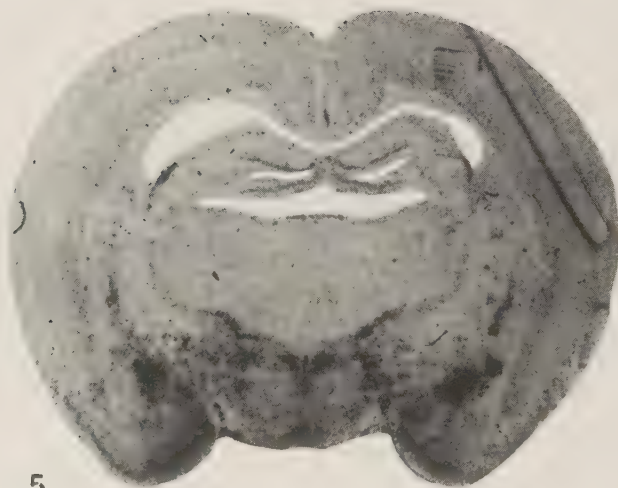
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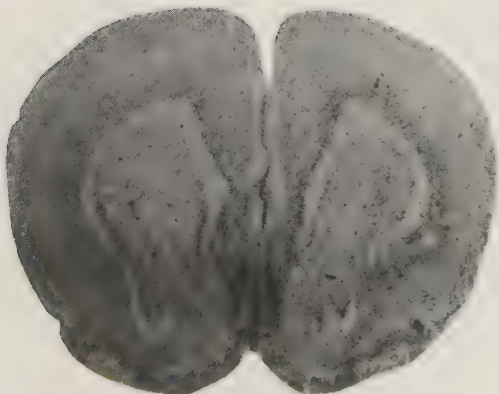
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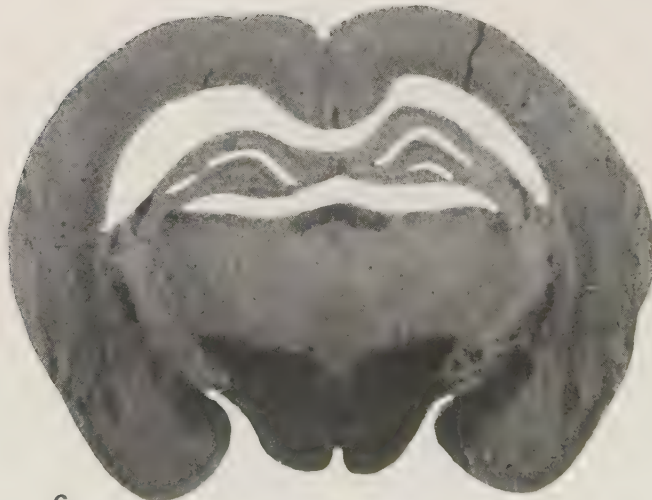
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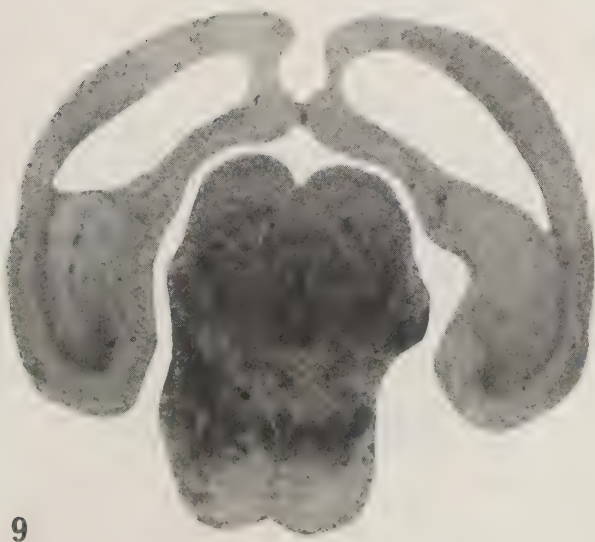
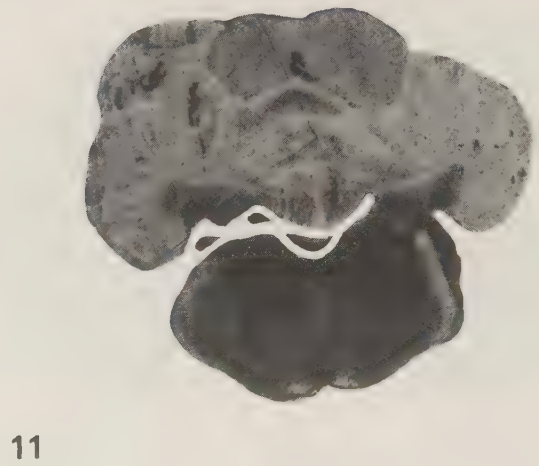
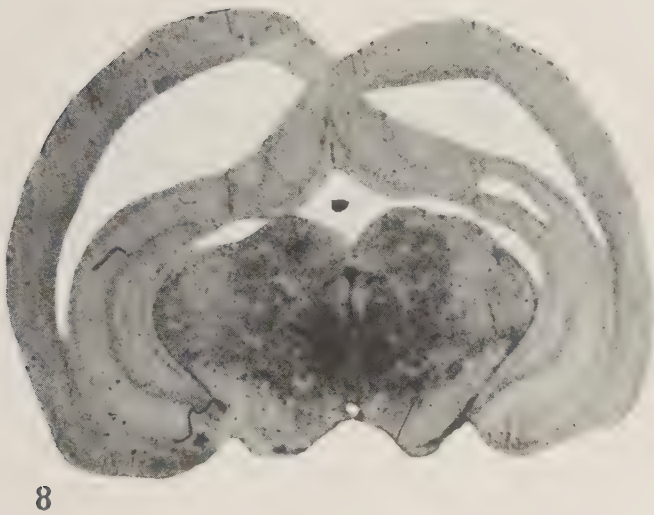
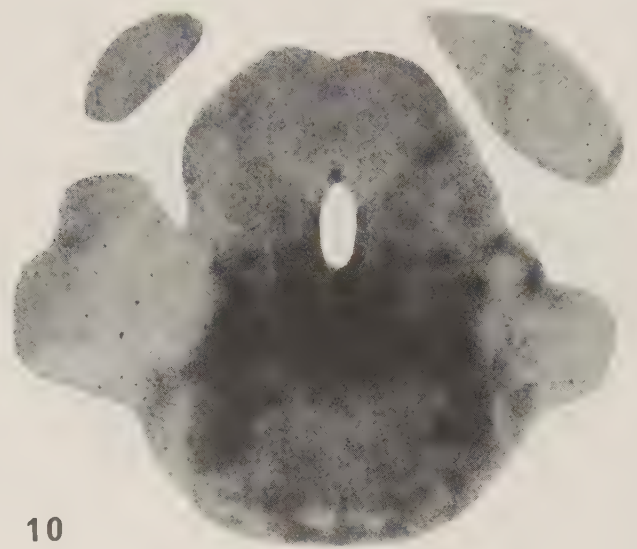
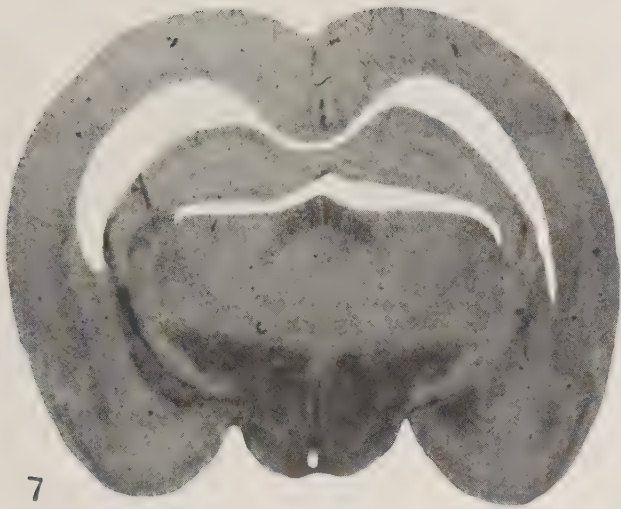
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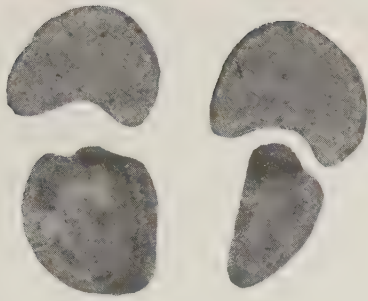


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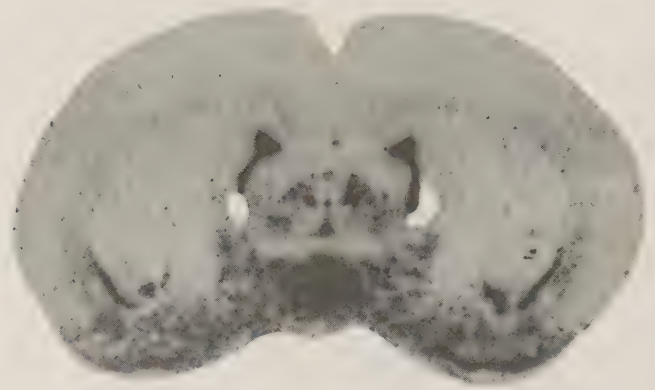
ADULTES

INJECTION 10,5 JOURS

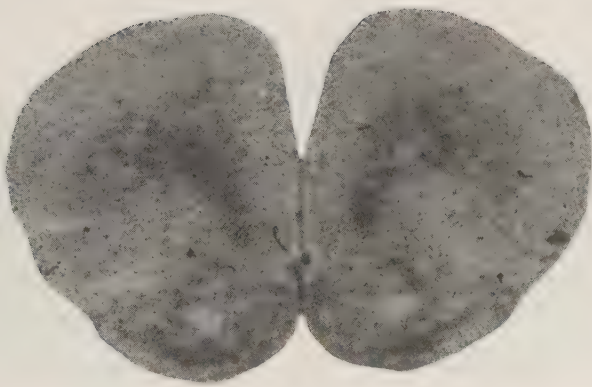




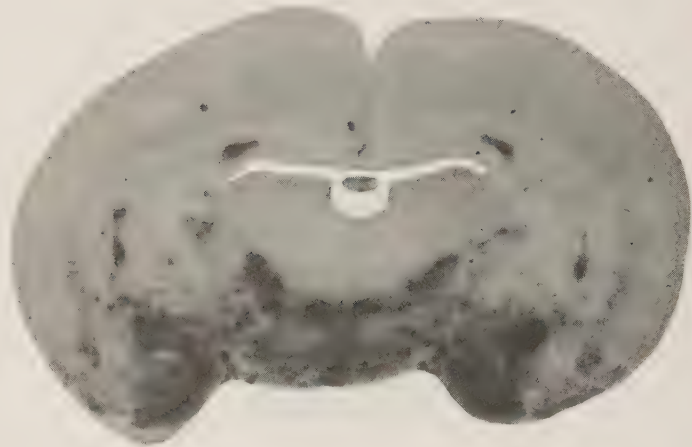
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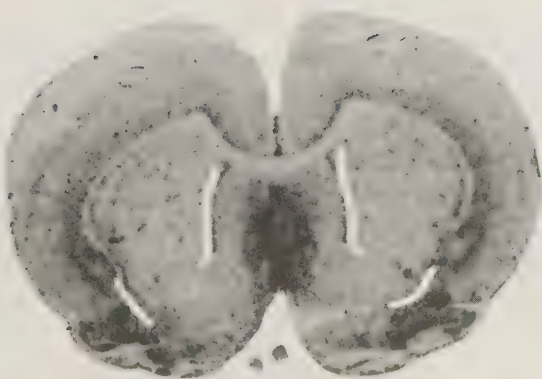
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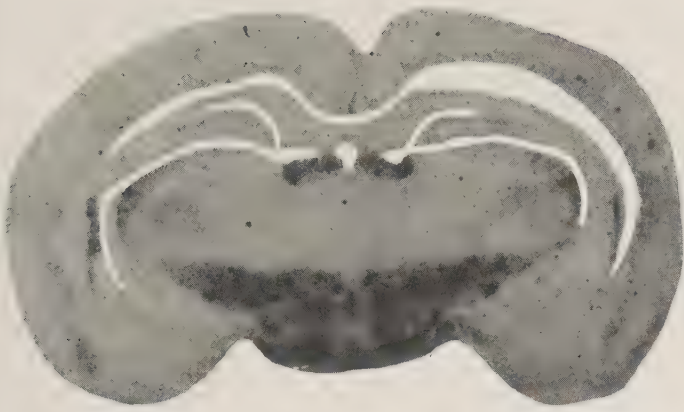
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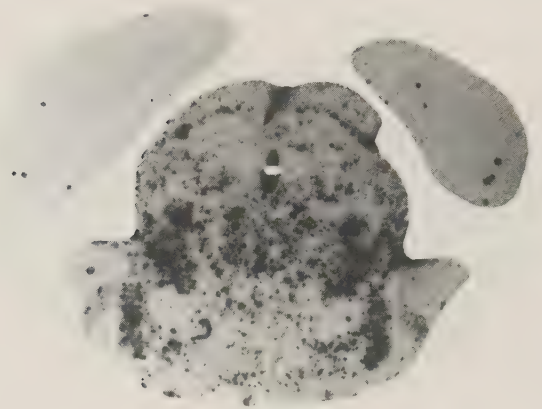
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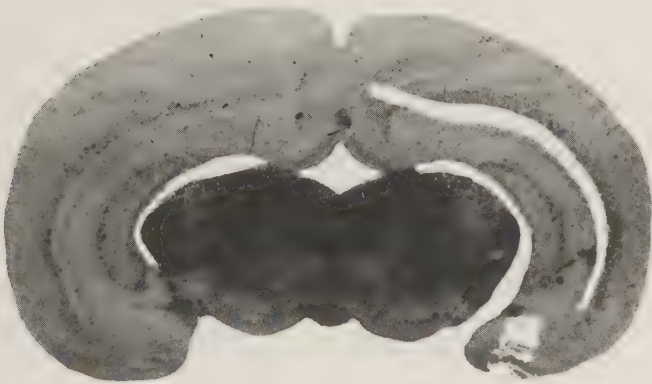
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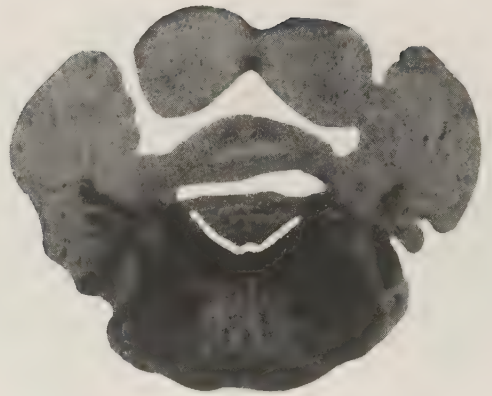
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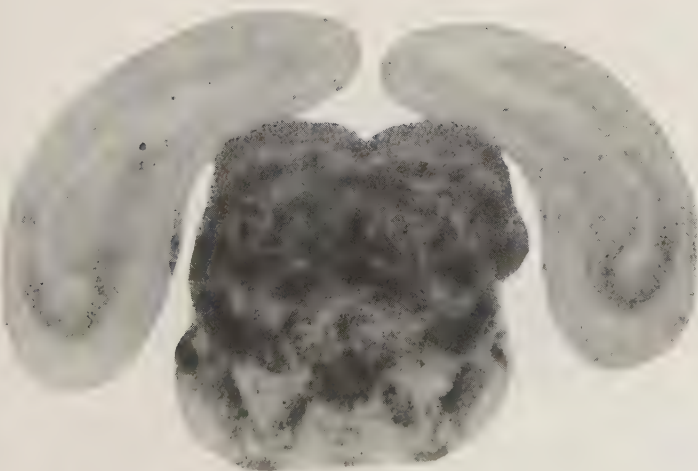
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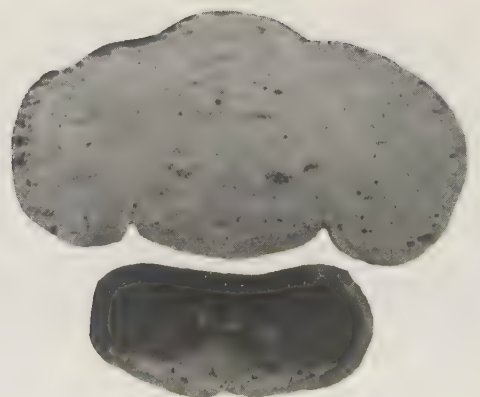
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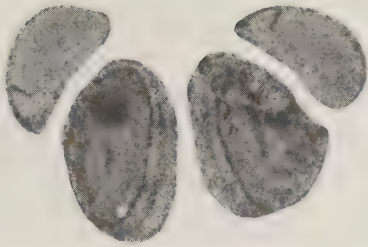
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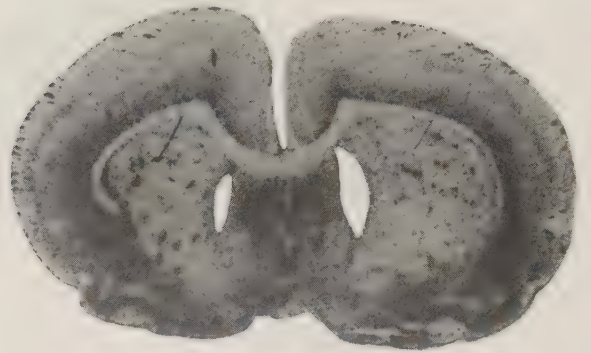
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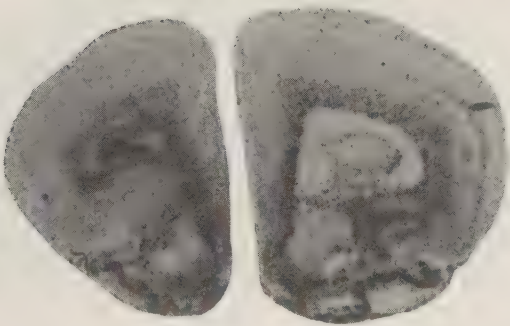
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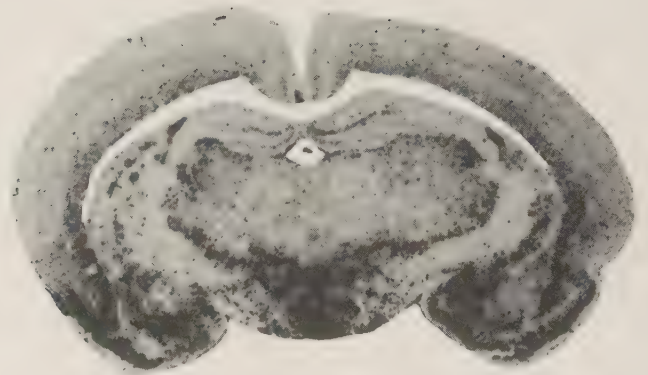
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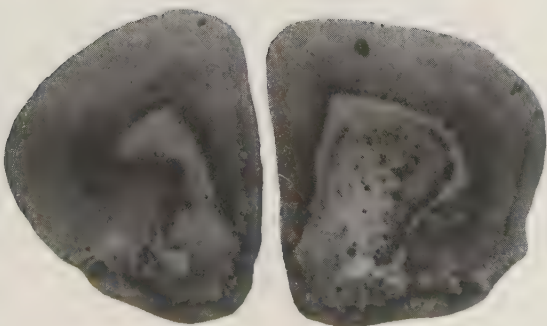
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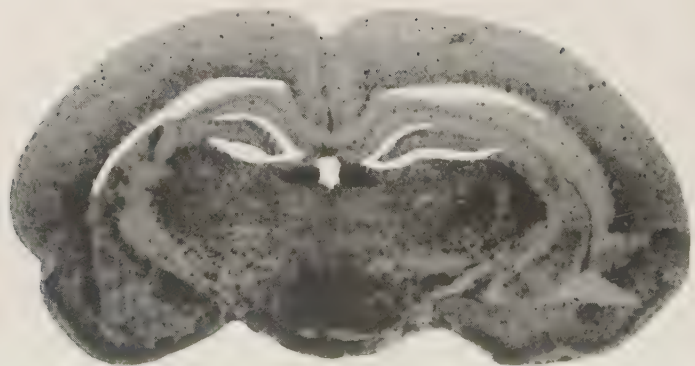
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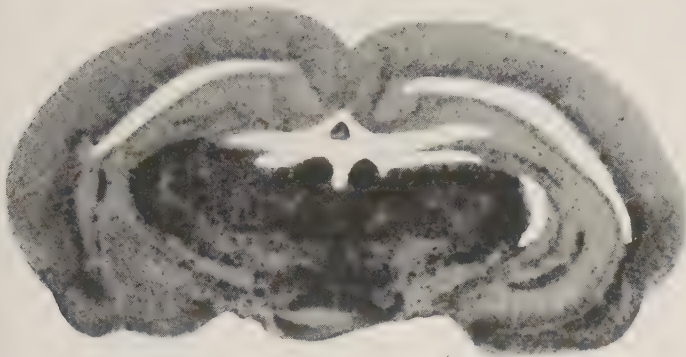
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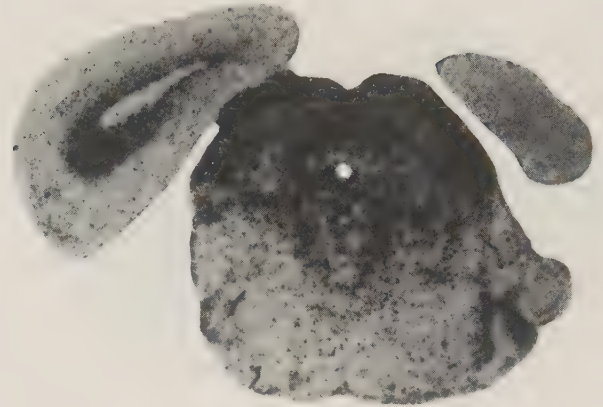
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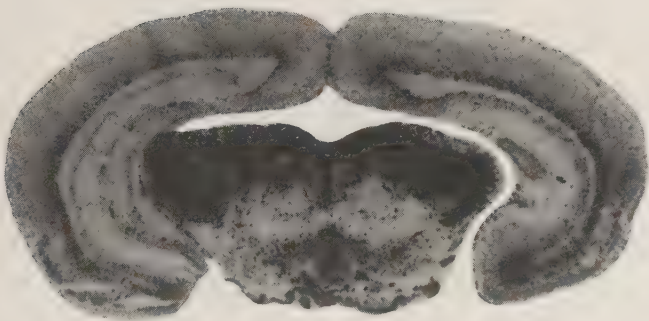
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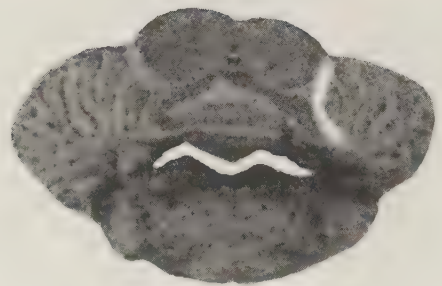
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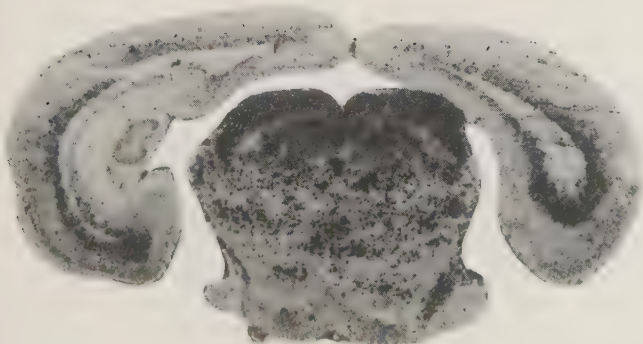
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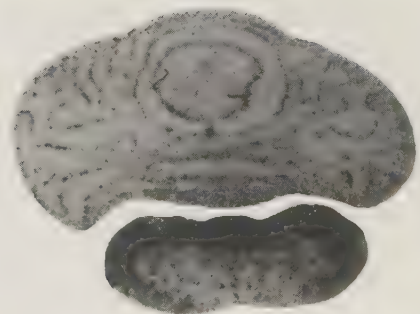
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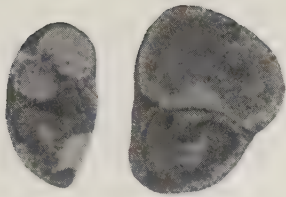
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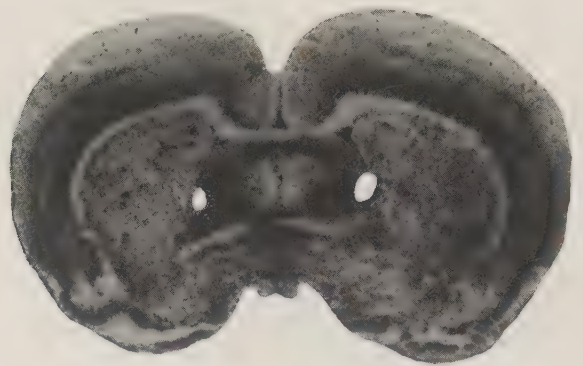
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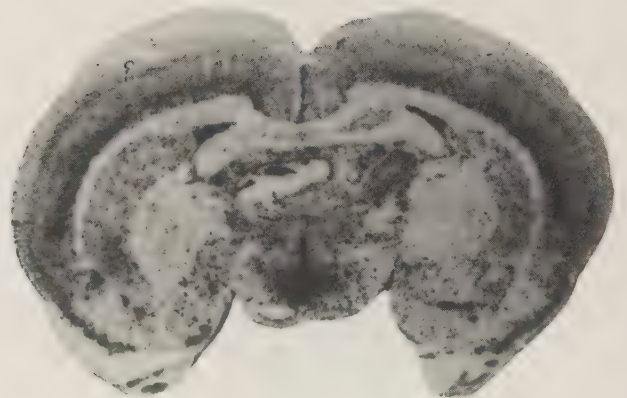
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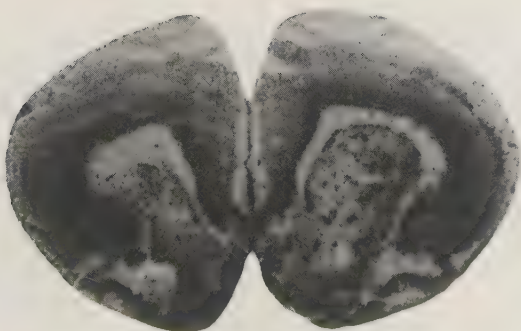
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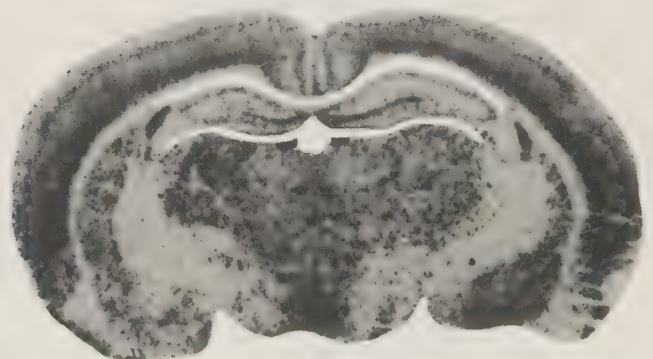
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5



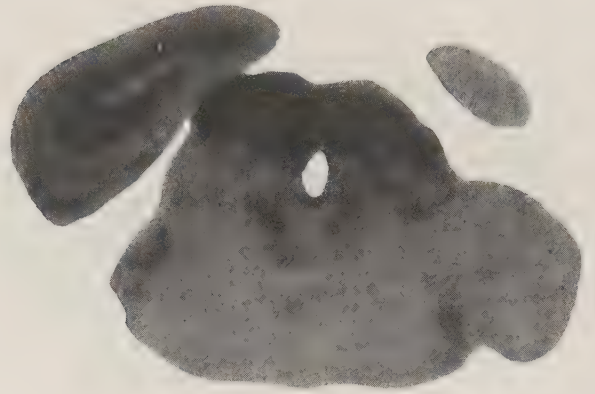
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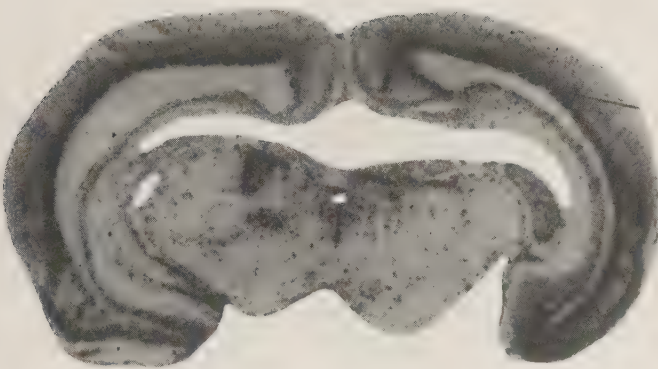
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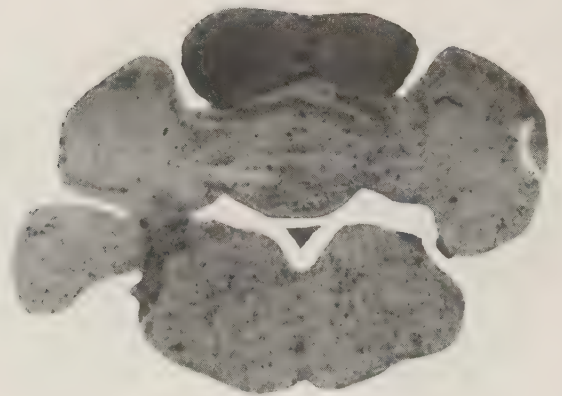
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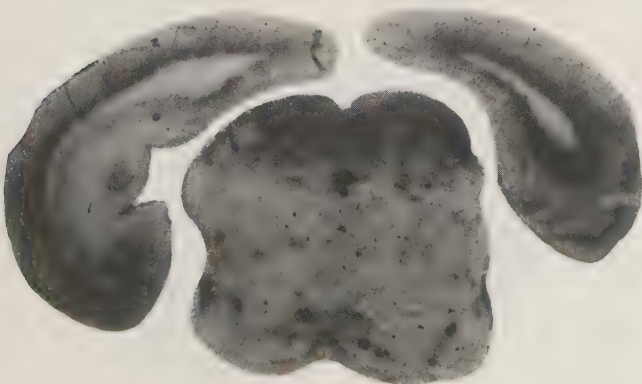
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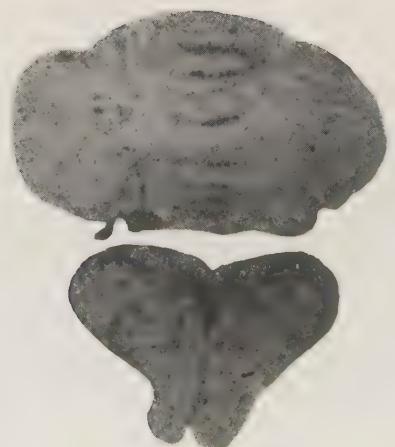
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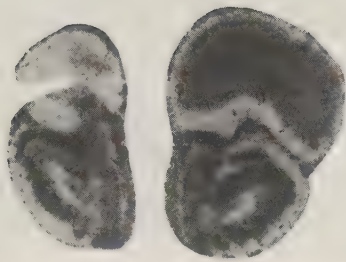
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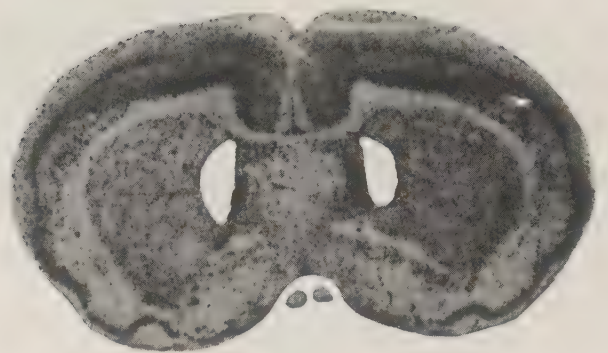
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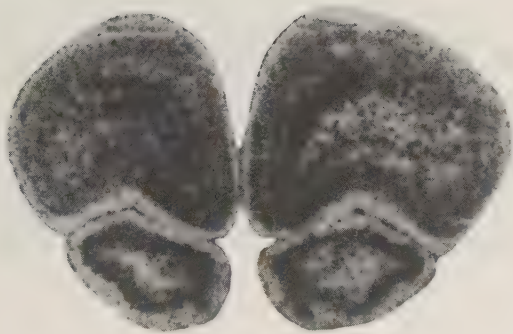
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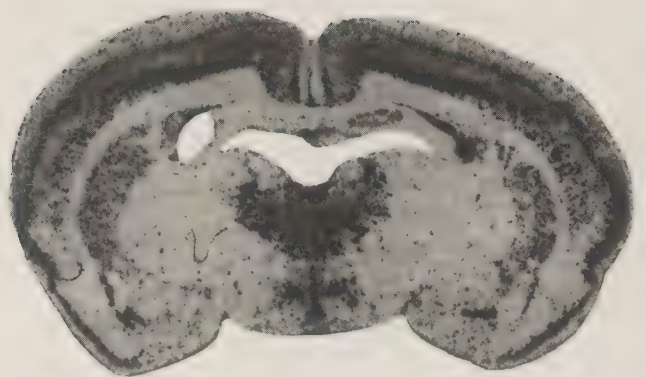
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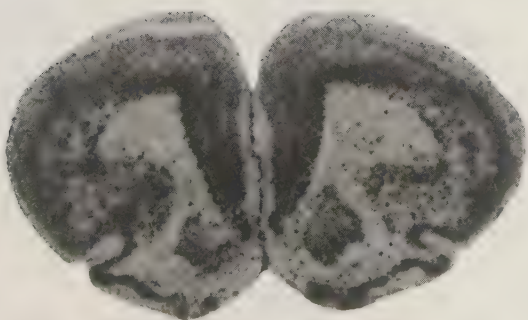
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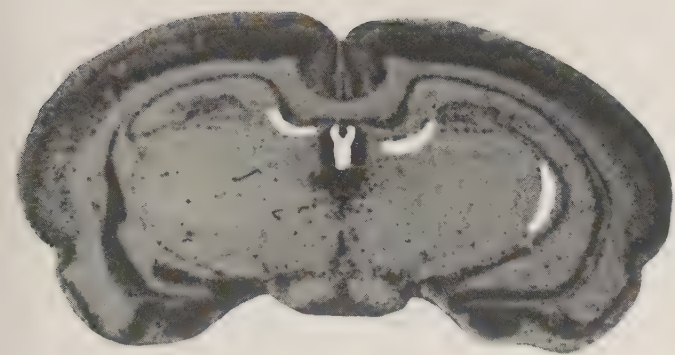
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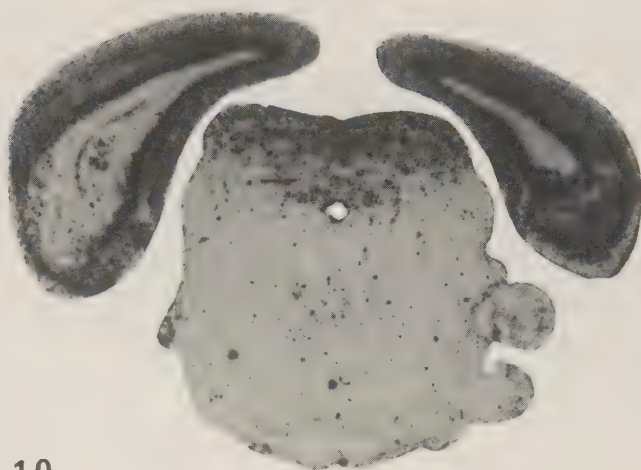
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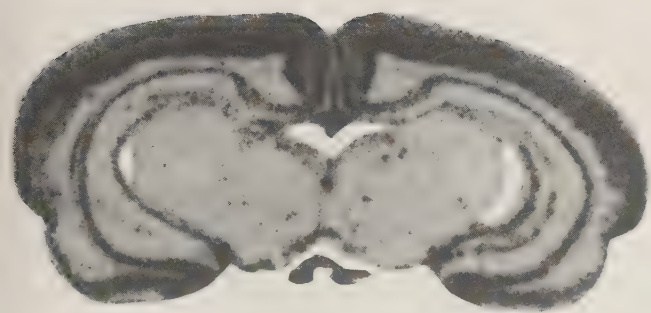
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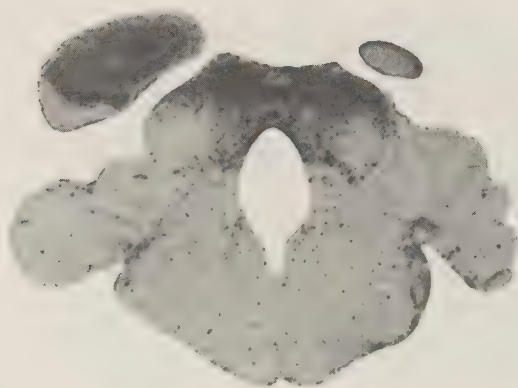
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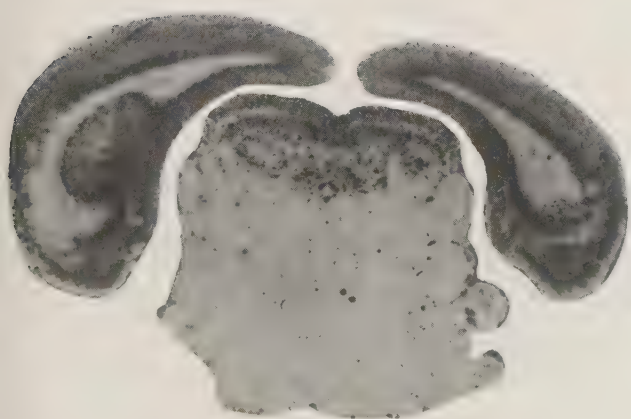
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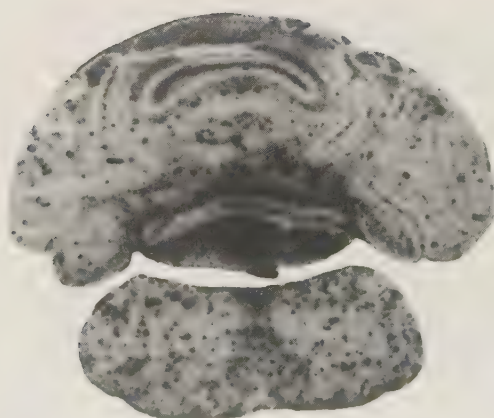
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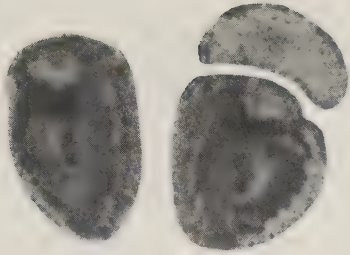
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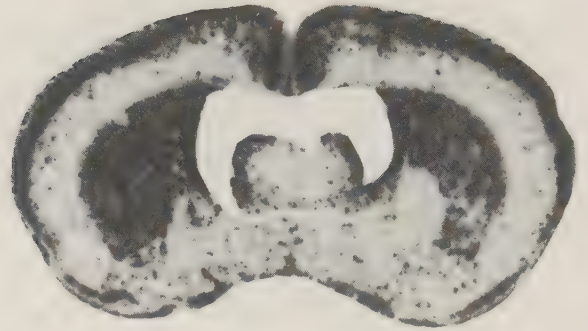
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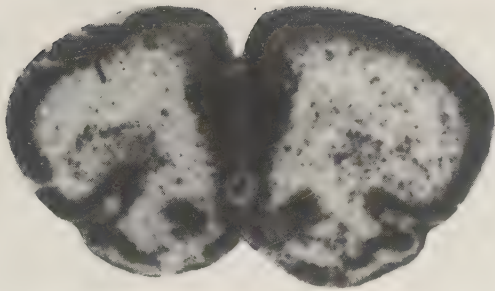
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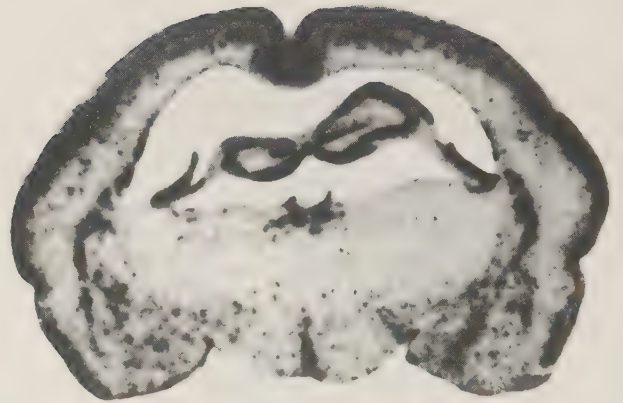
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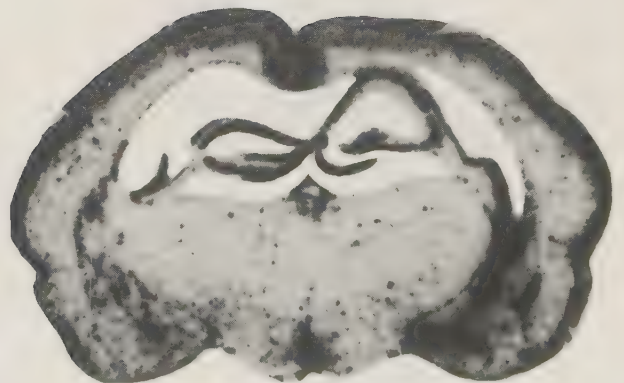
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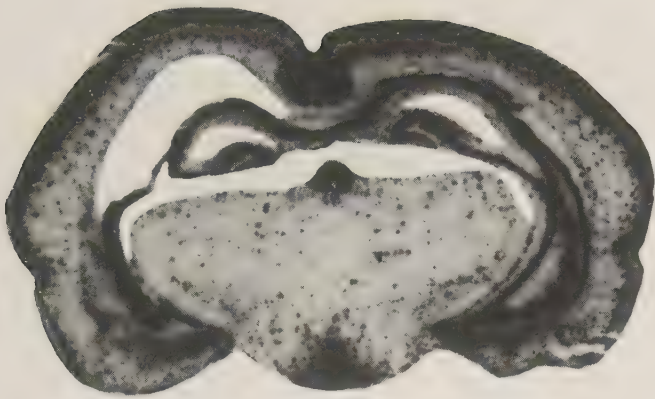
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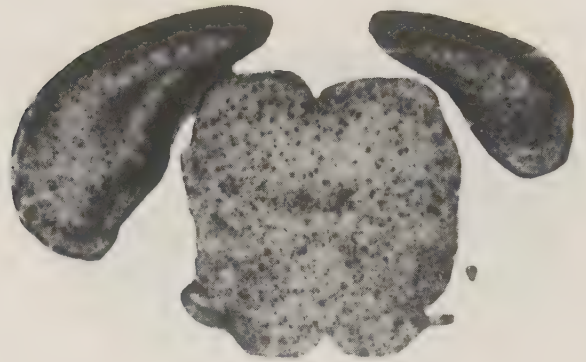
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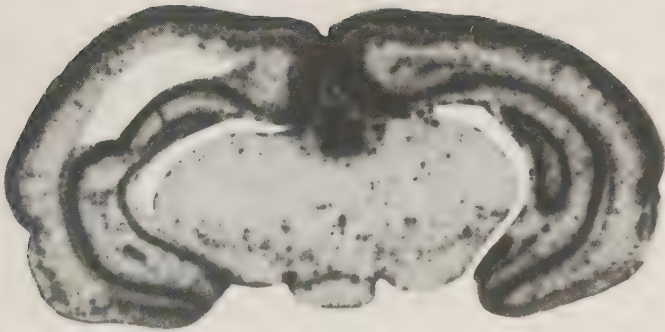
INJECTION 15,5 JOURS



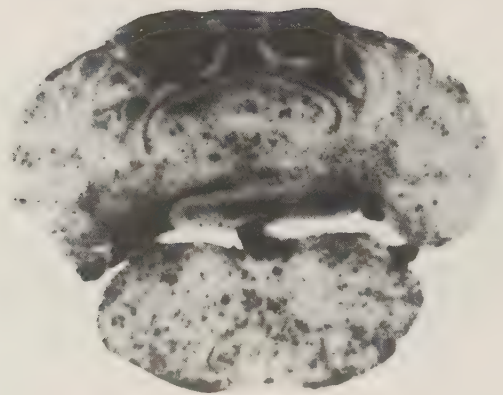
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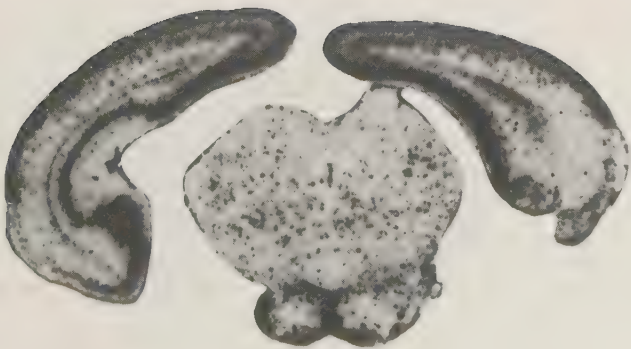
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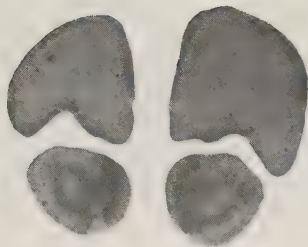
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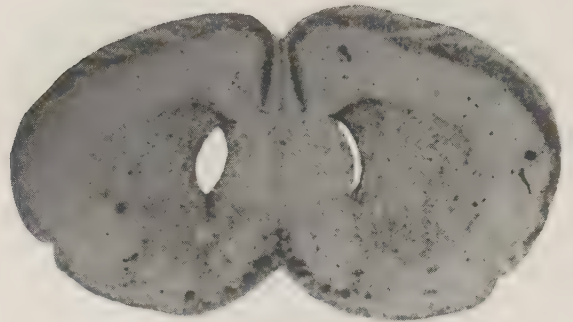
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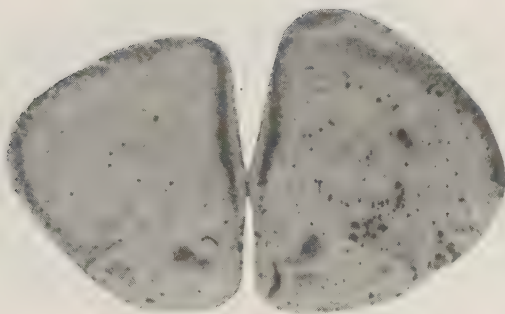
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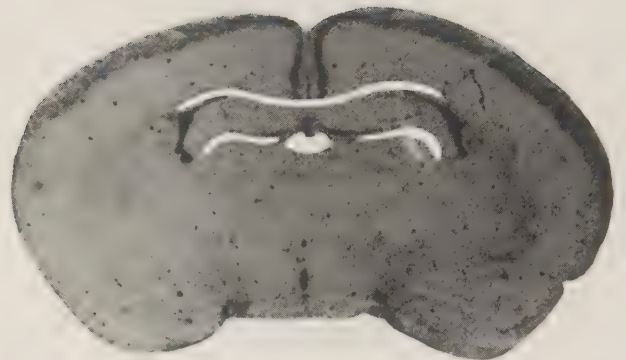
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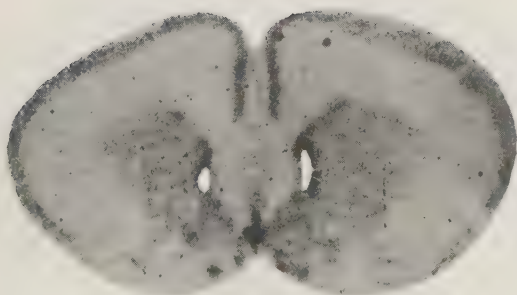
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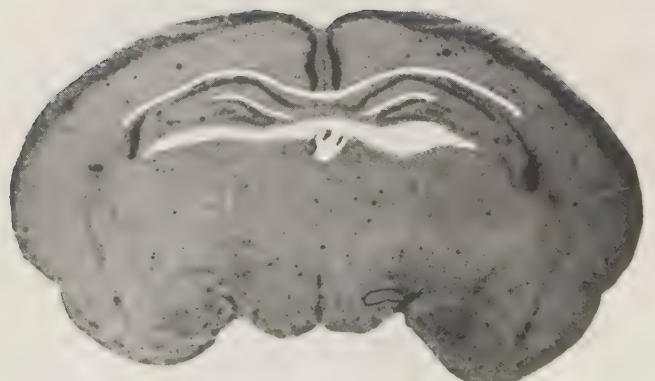
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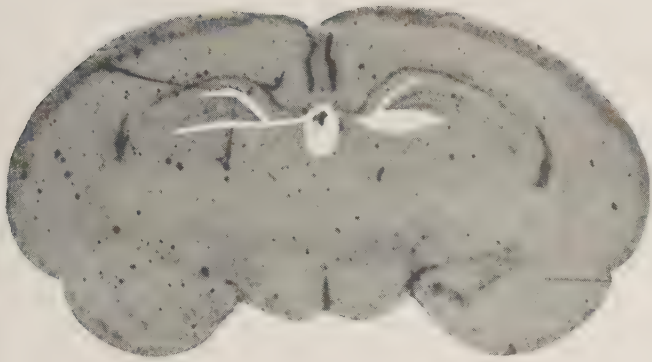
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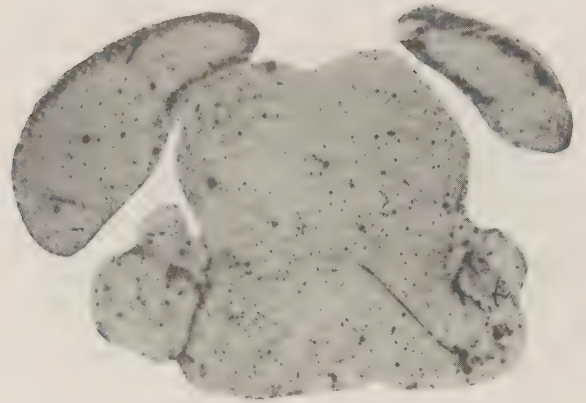
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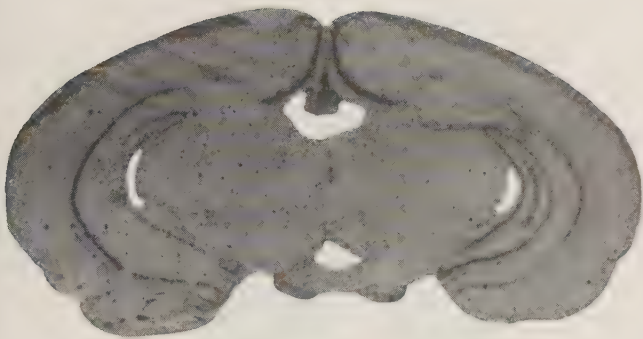
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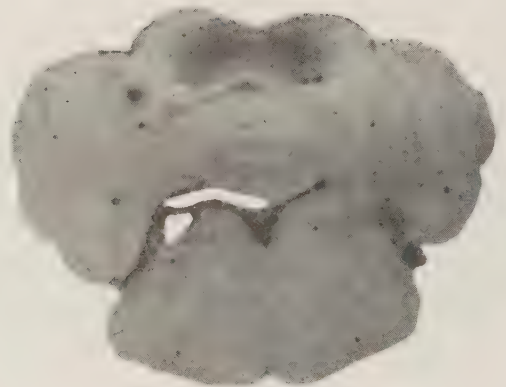
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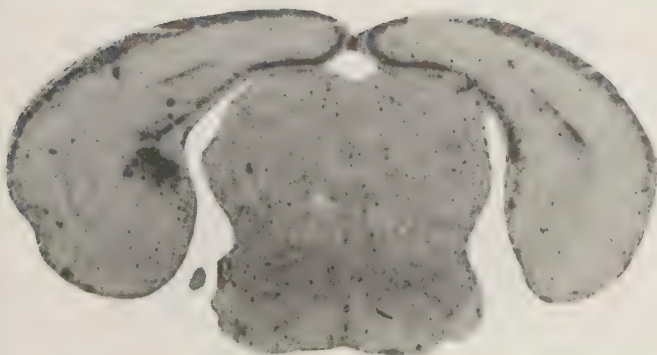
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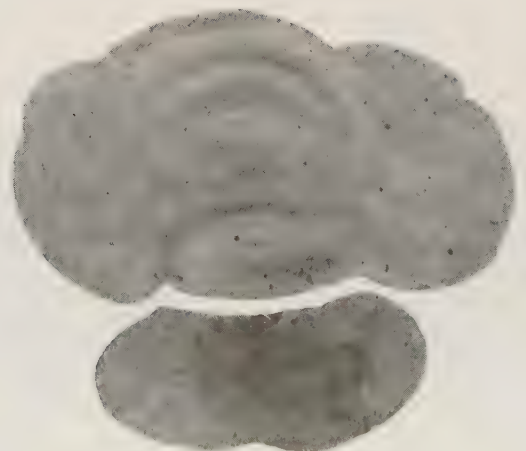
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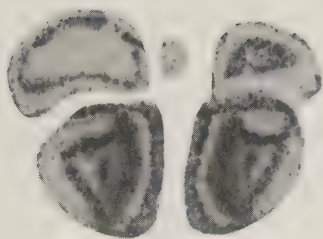
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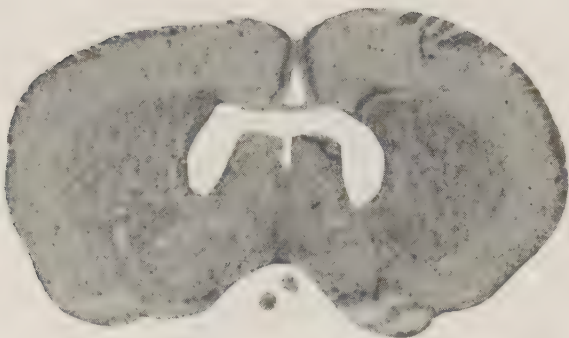
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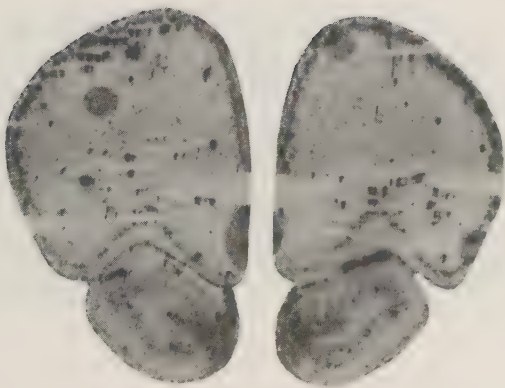
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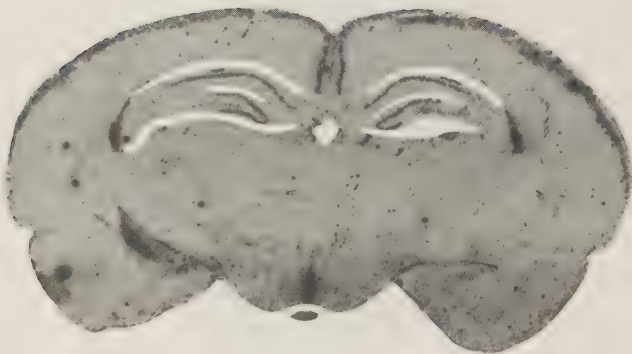
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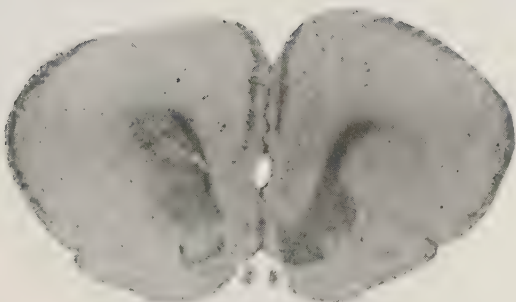
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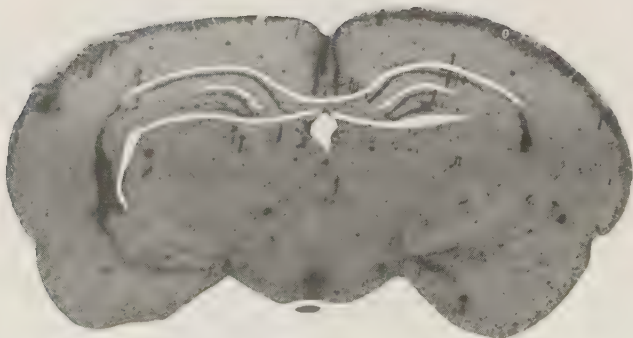
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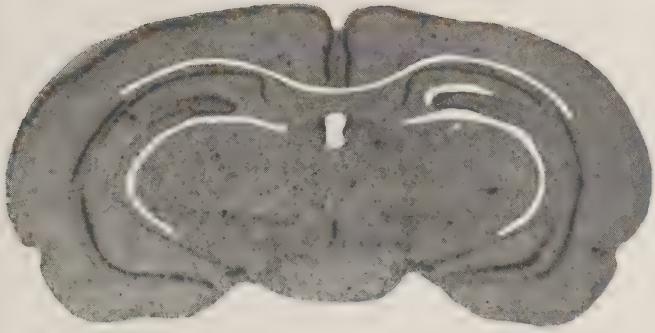
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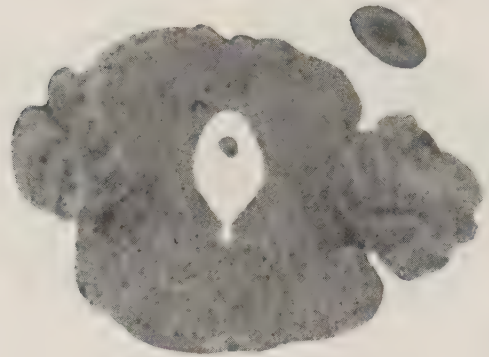
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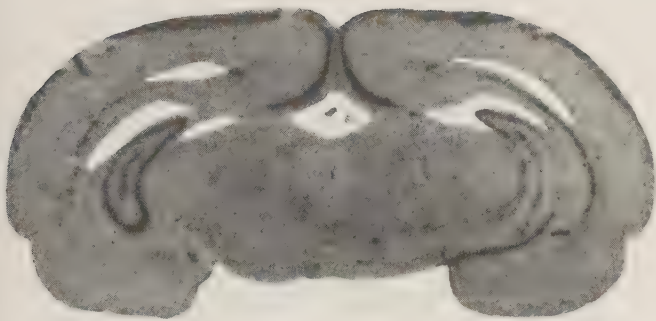
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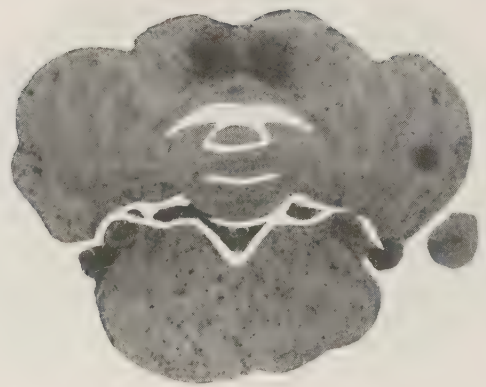
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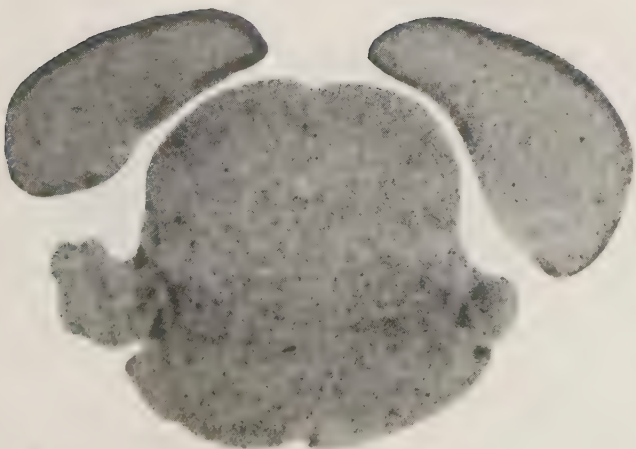
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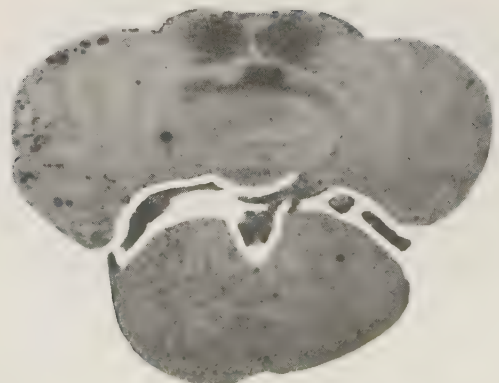
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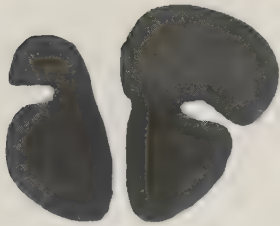
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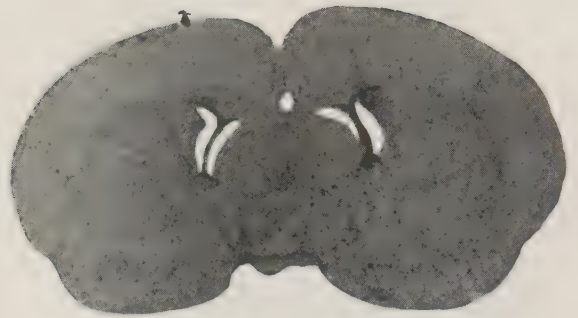
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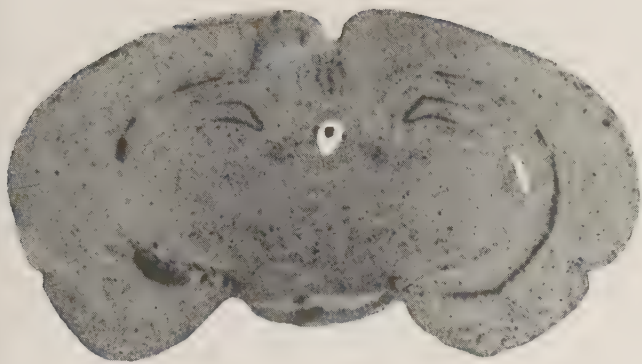
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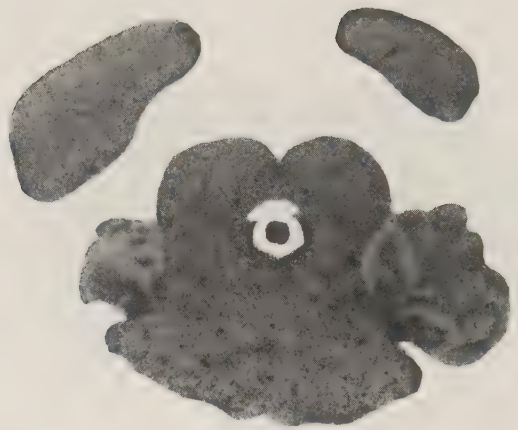
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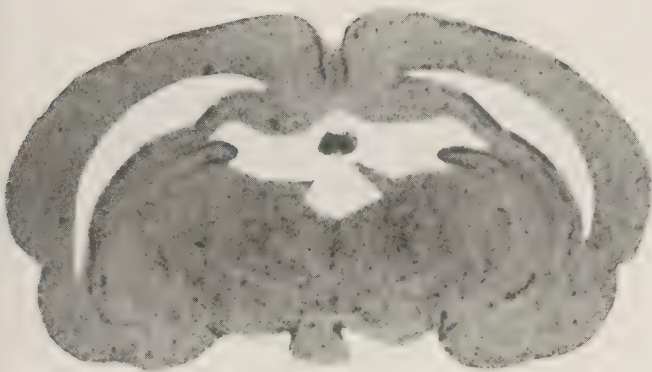
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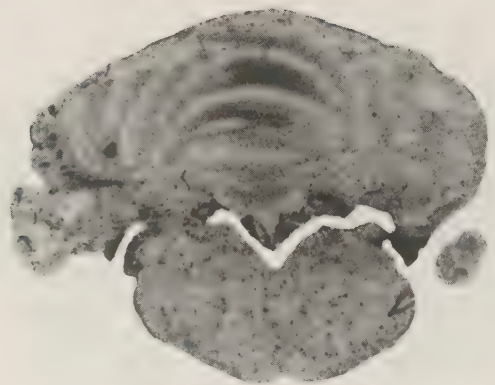
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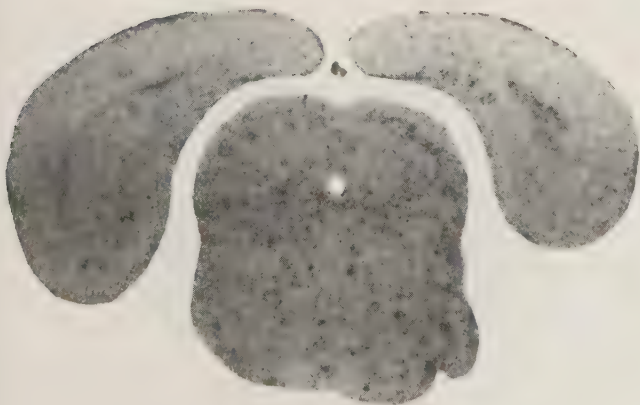
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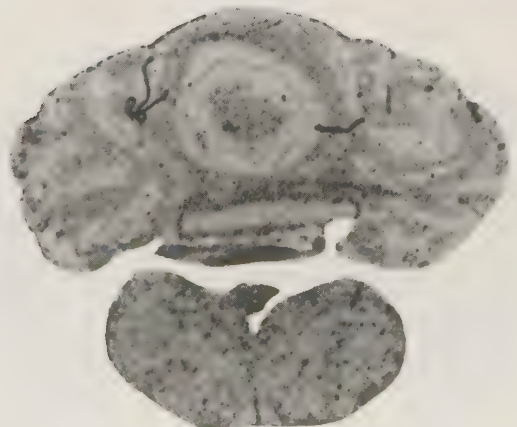
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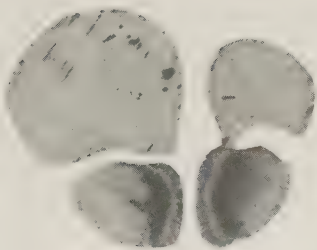
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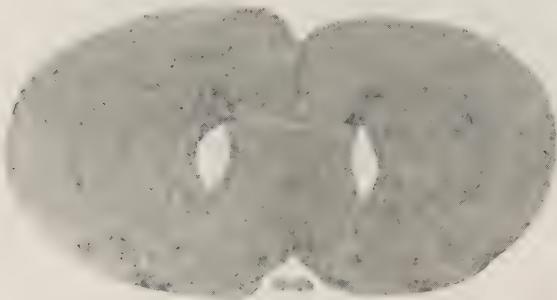
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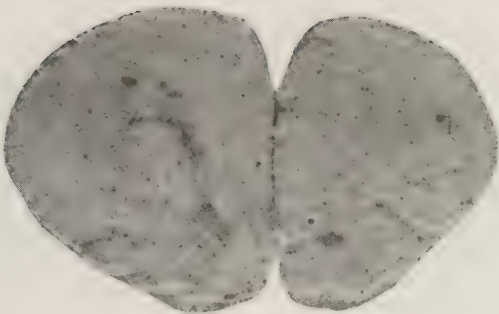
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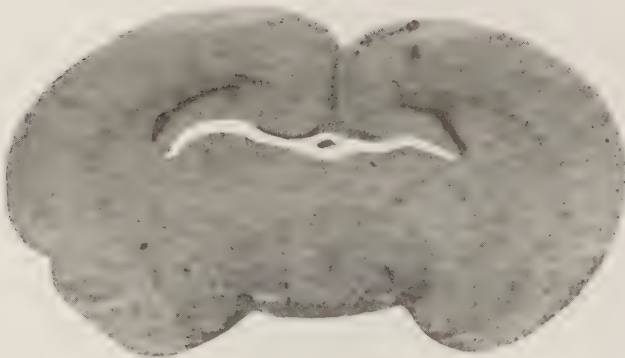
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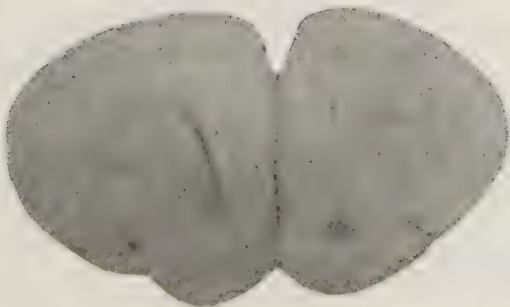
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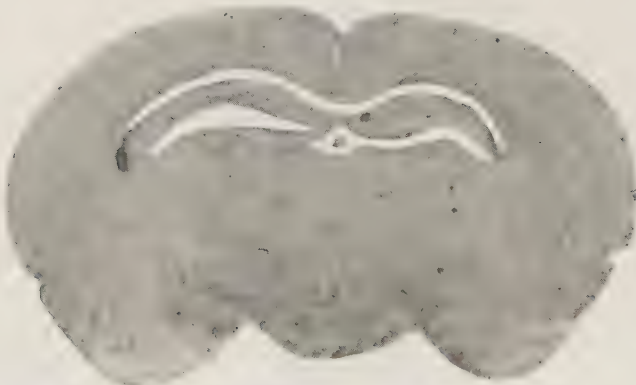
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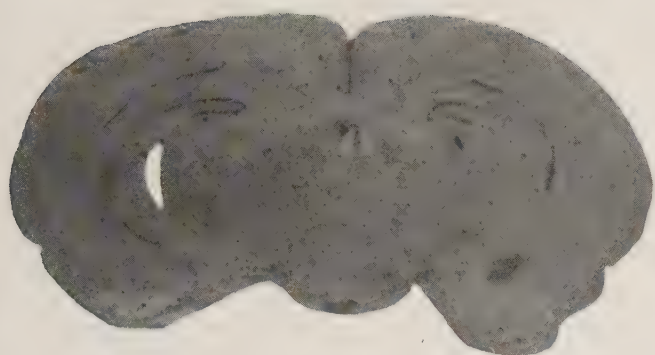
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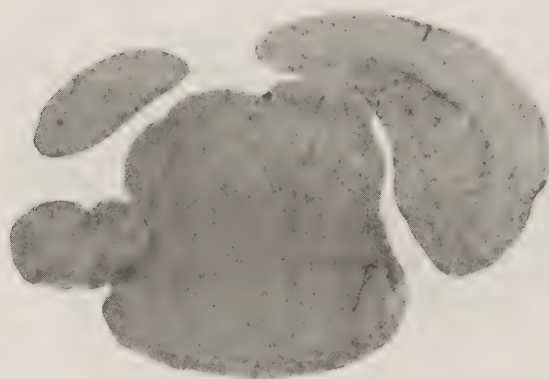
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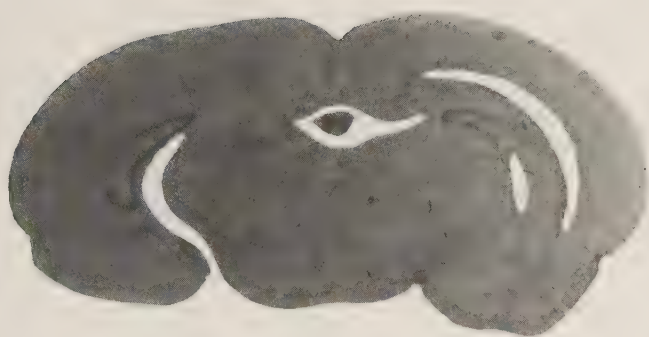
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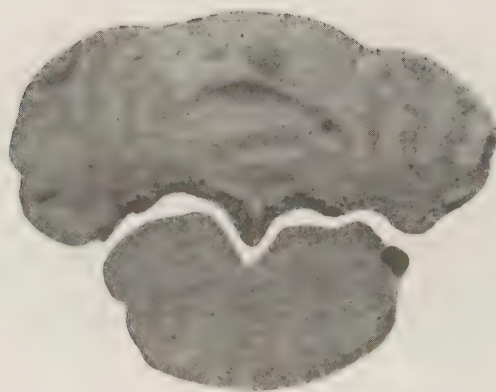
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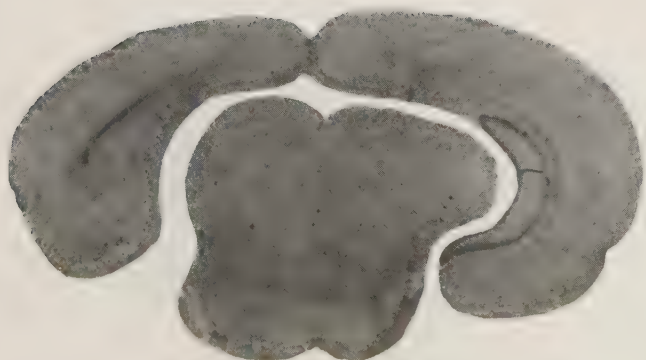
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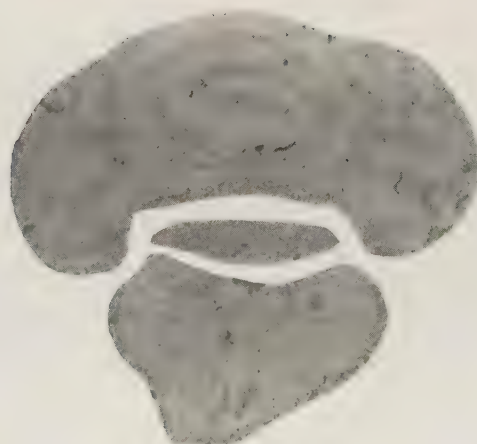
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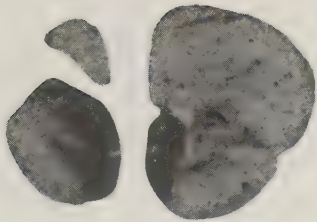
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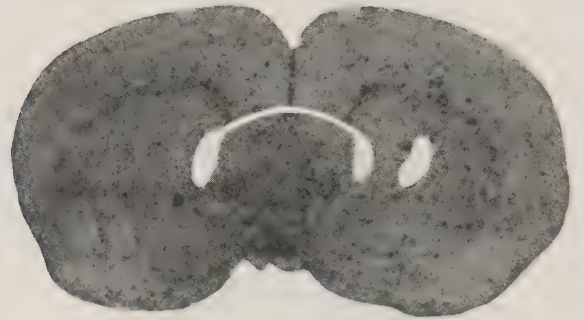
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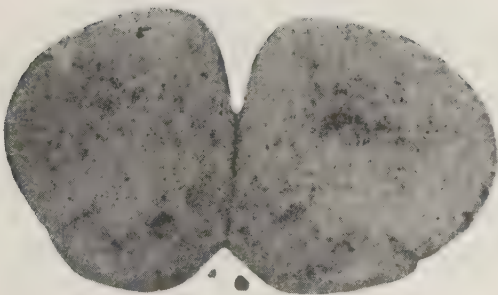
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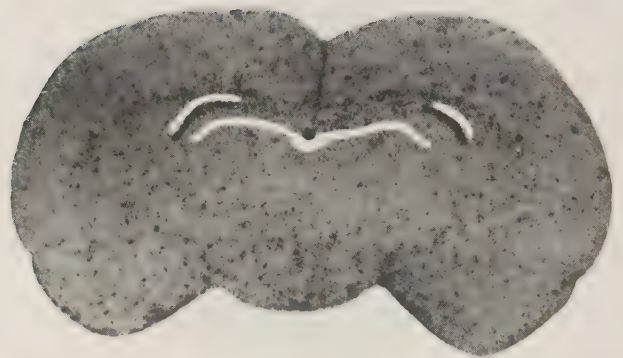
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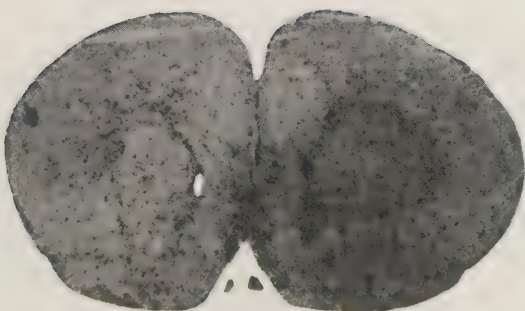
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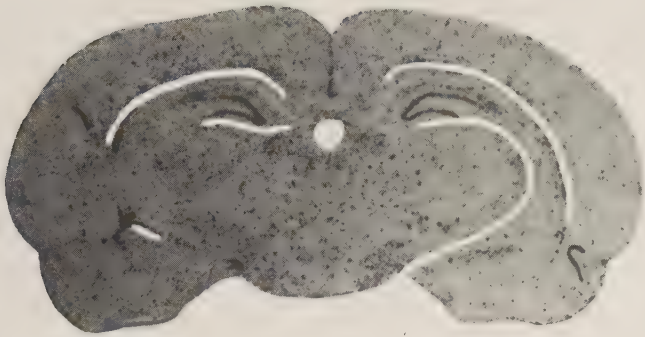
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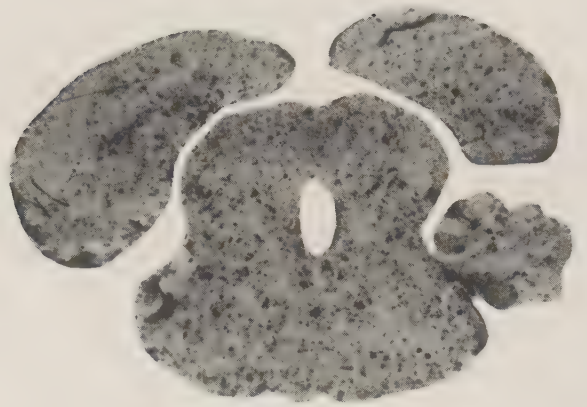
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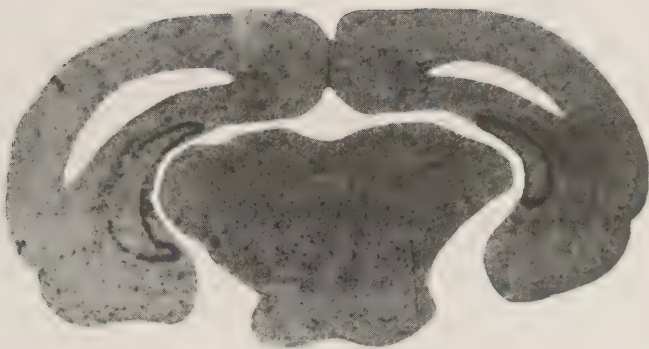
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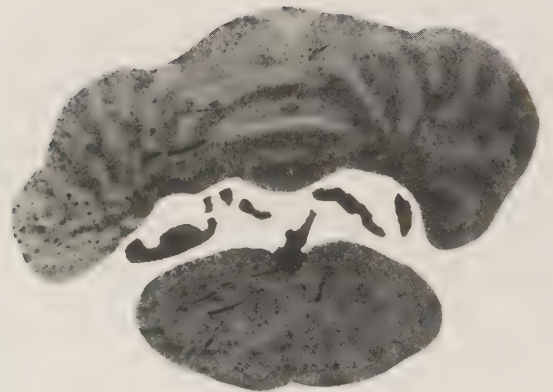
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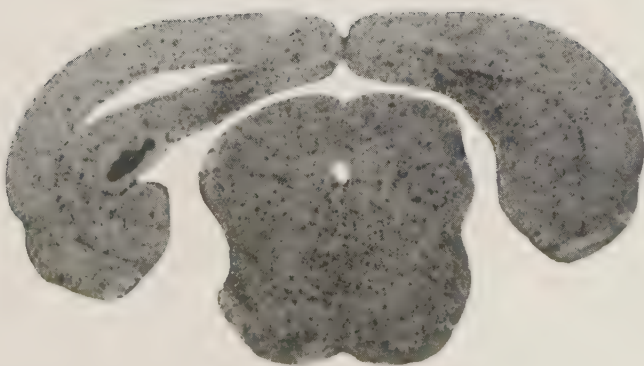
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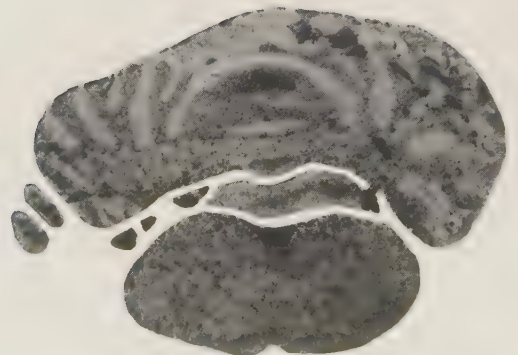
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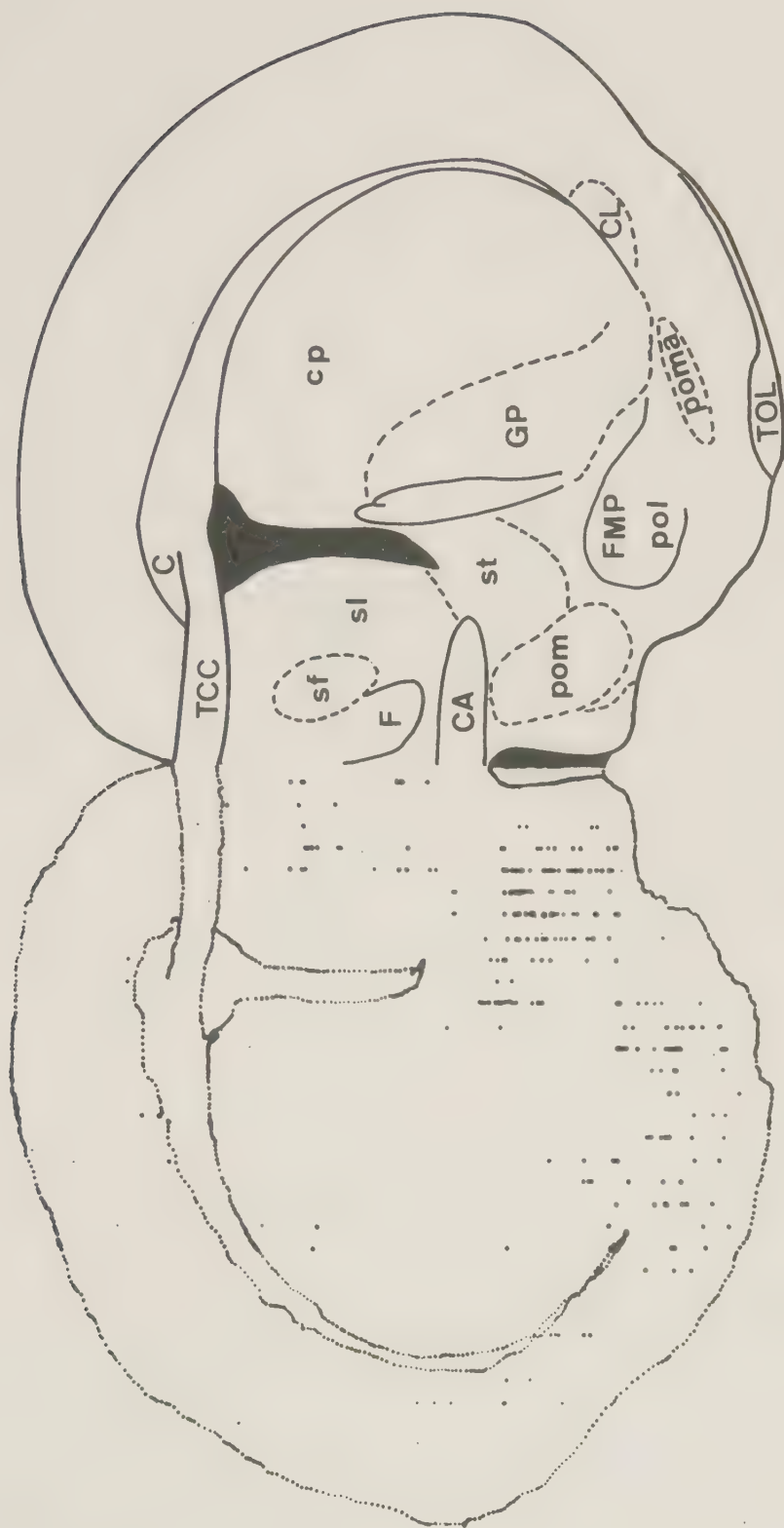
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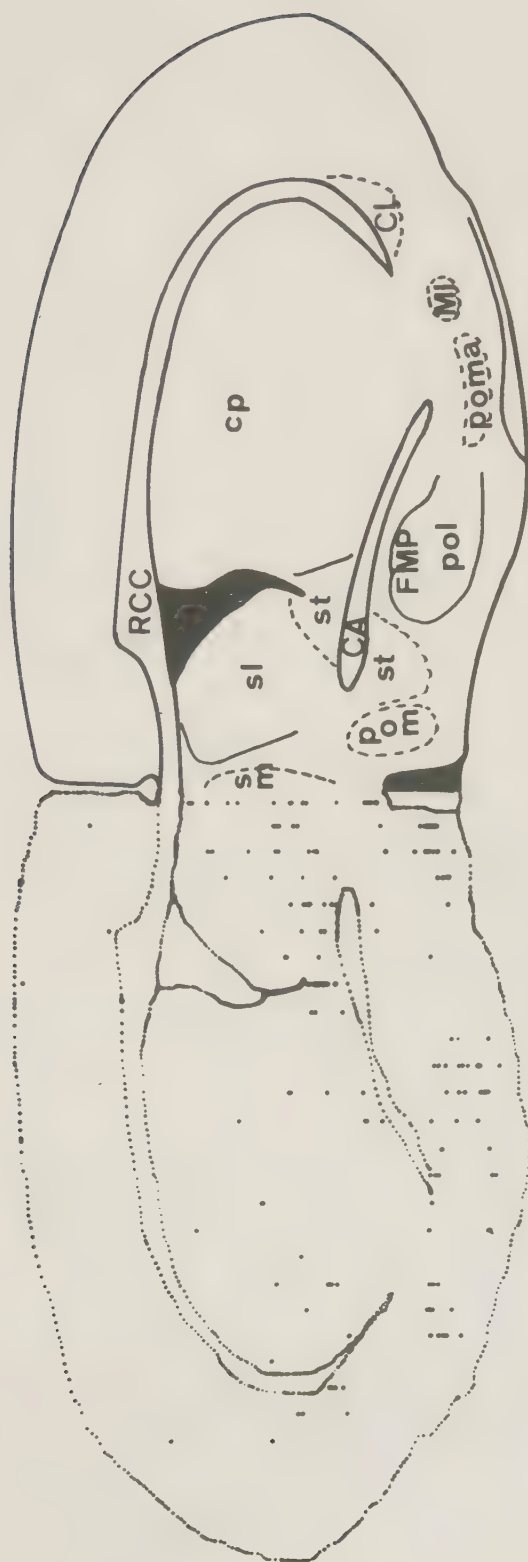
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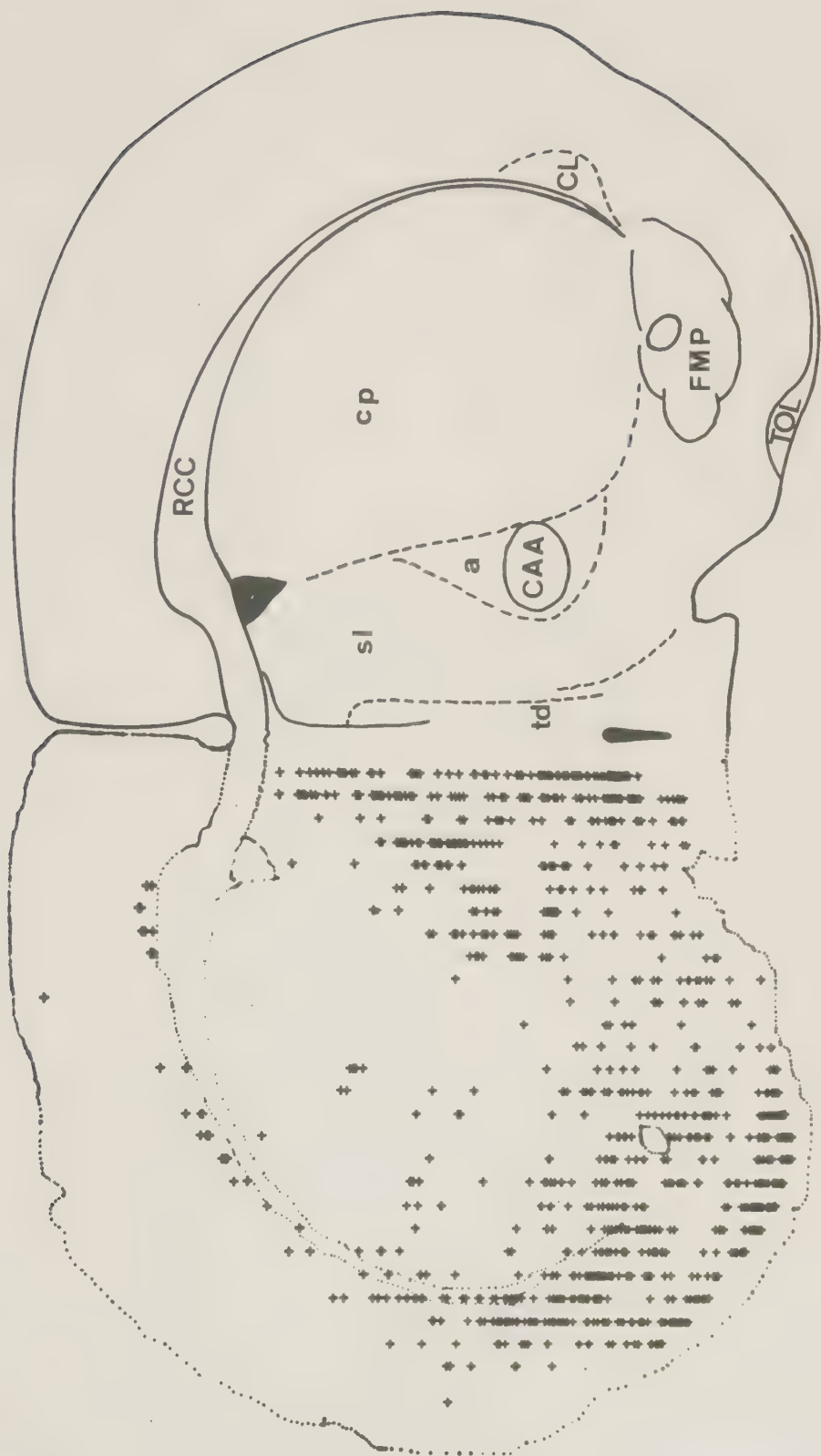
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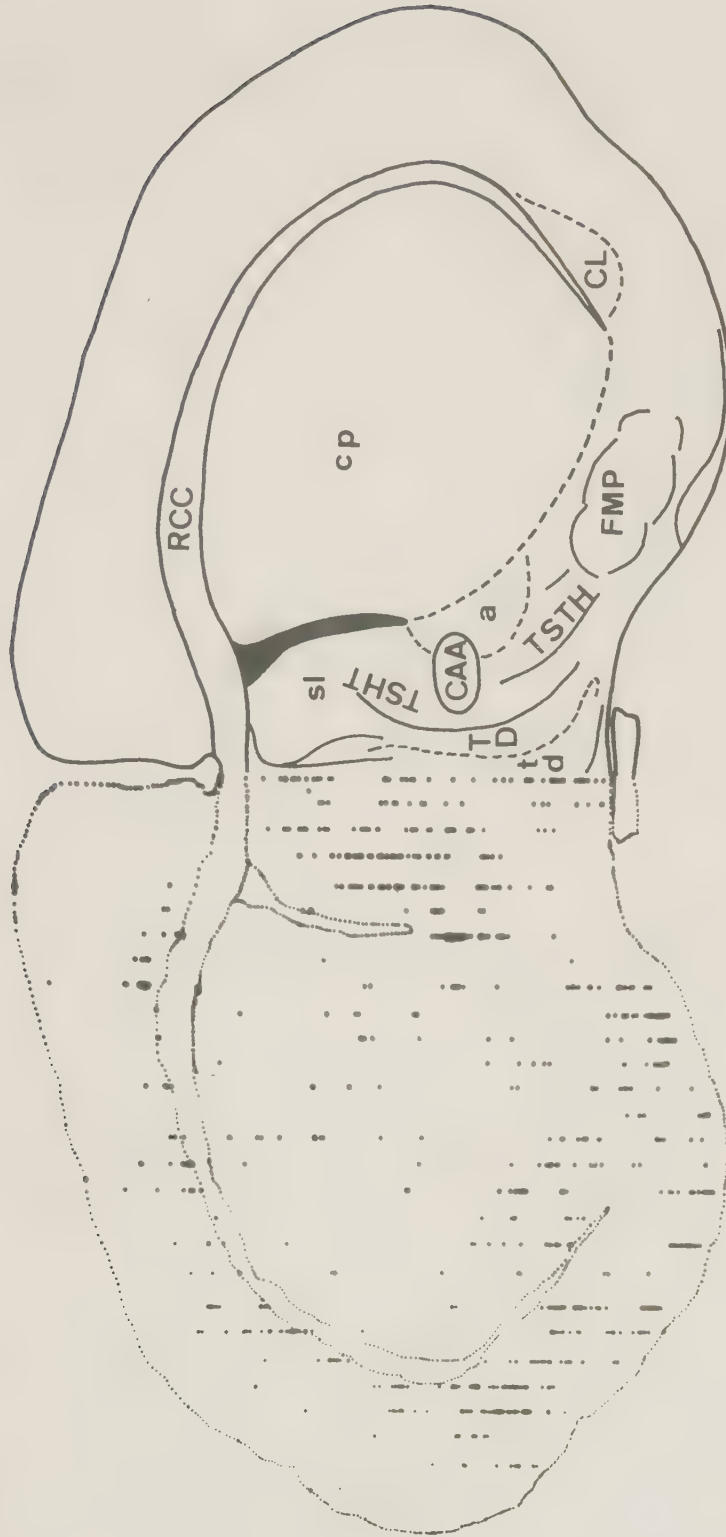
NIVEAU IV INJECTION 11,5 JOURS



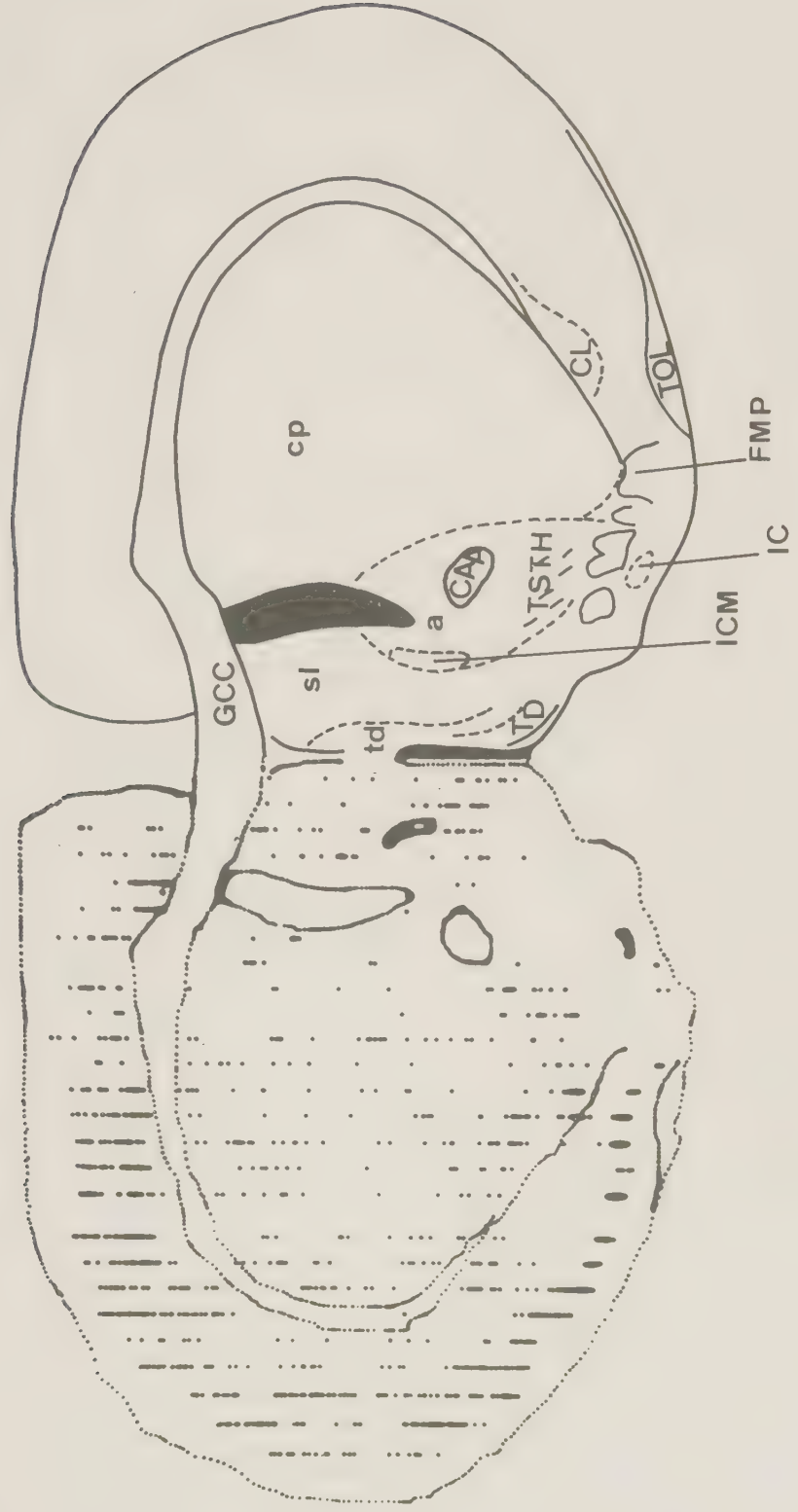
NIVEAU	IV	INJECTION	12,5	JOURS
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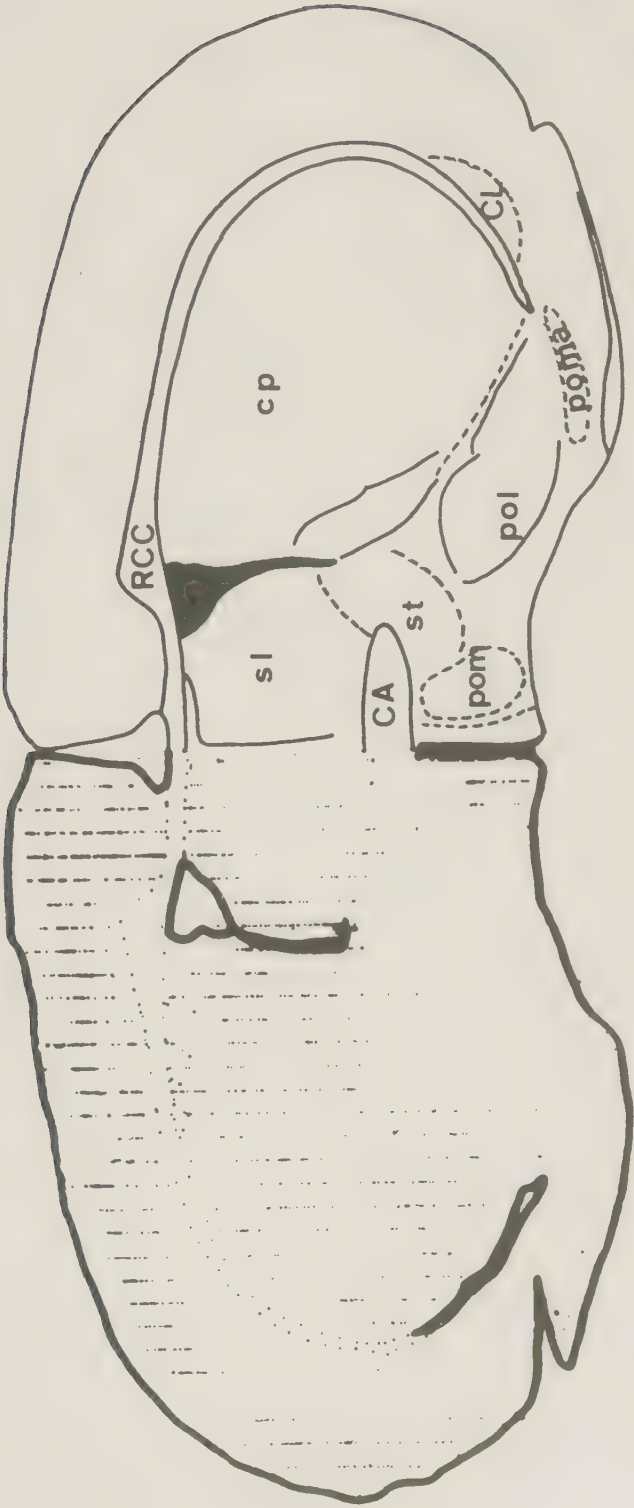
NIVEAU IV INJECTION 13.5 JOURS



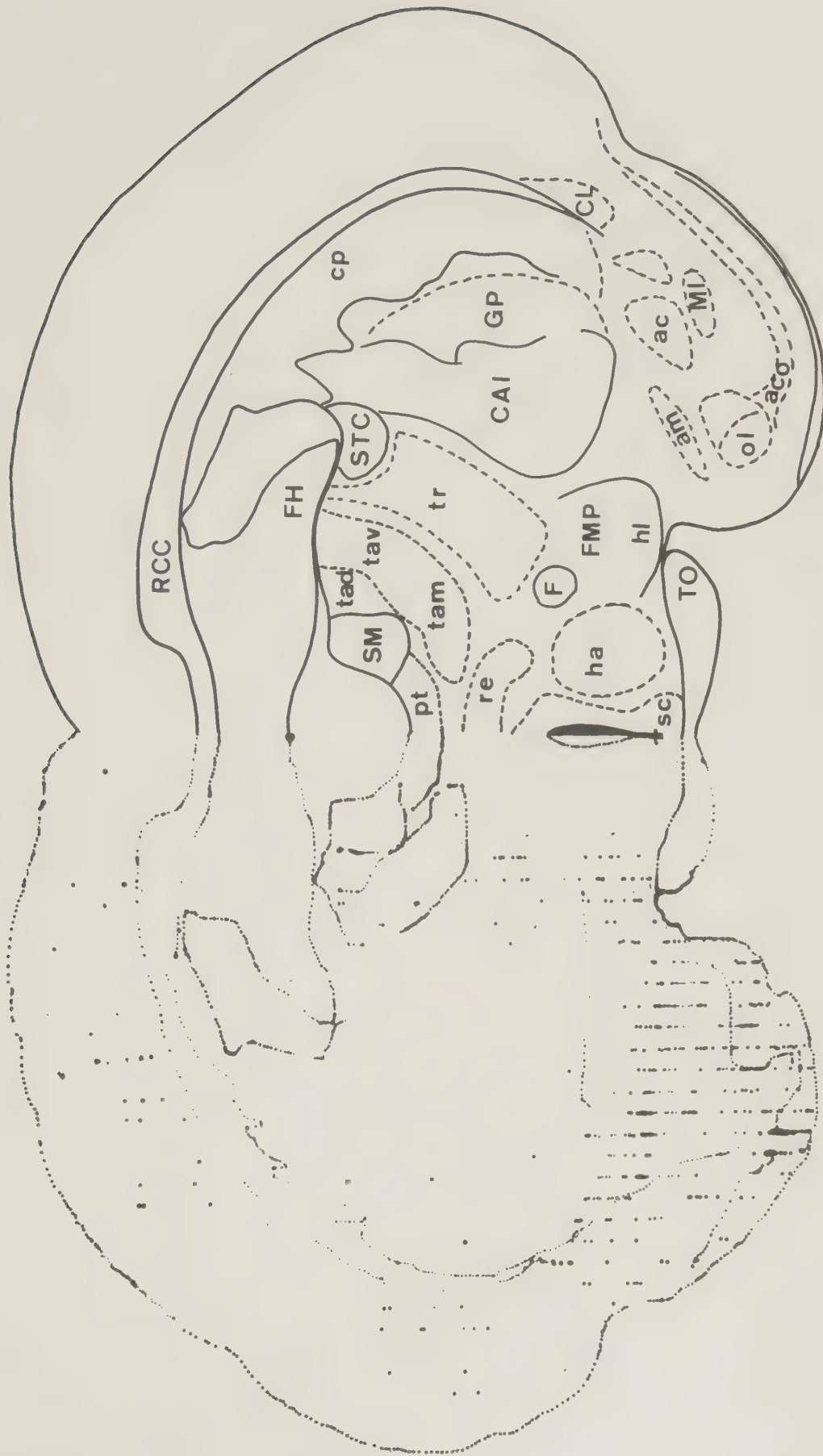
NIVEAU IV INJECTION 14,5 JOURS



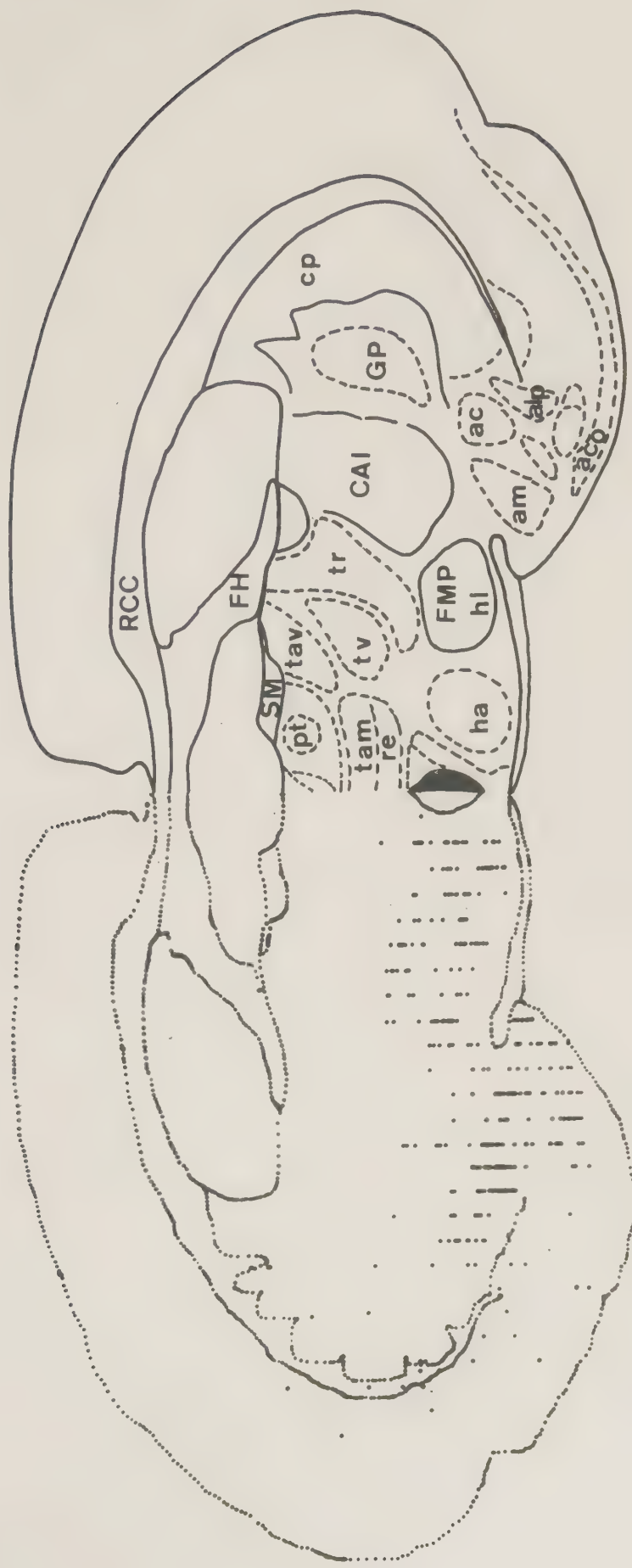
NIVEAU IV INJECTION 15,5 JOURS



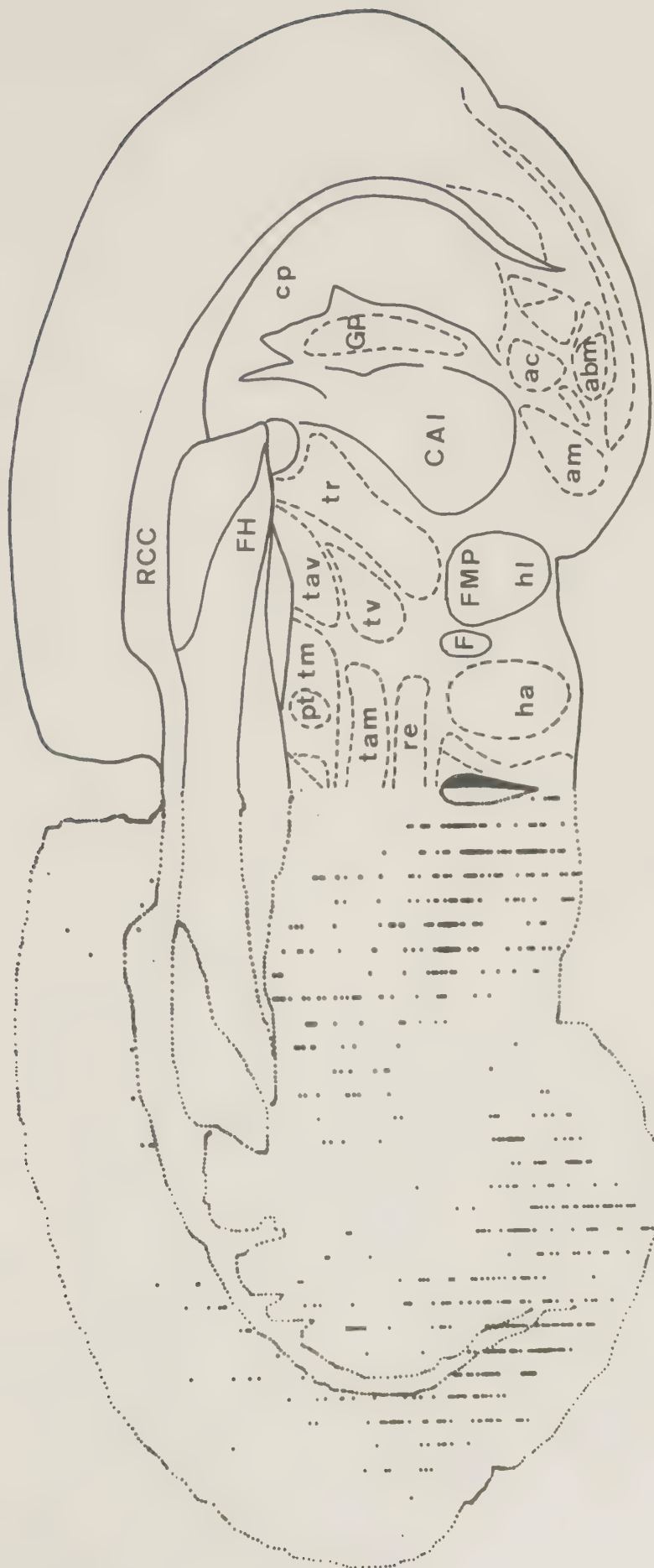
NIVEAU IV INJECTION 165 JOURS



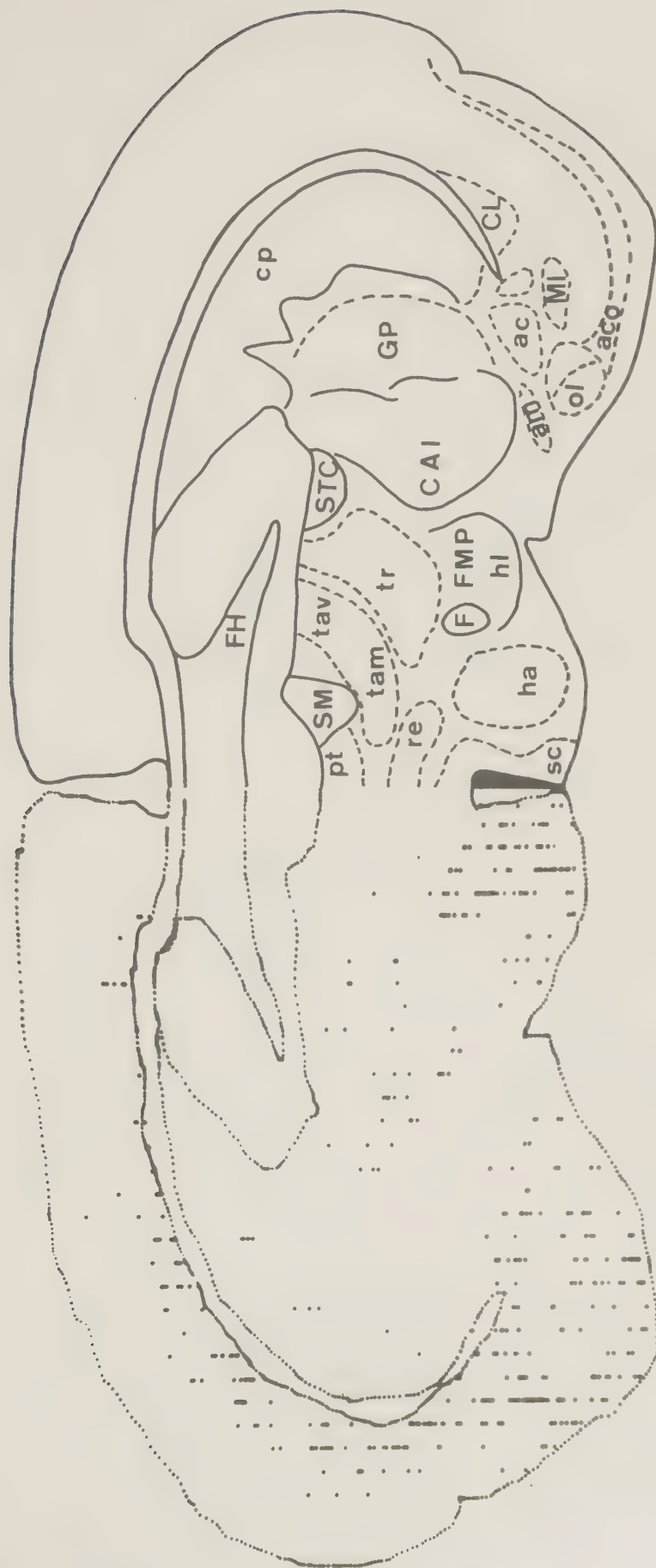
NIVEAU V INJECTION 11,5 JOURS



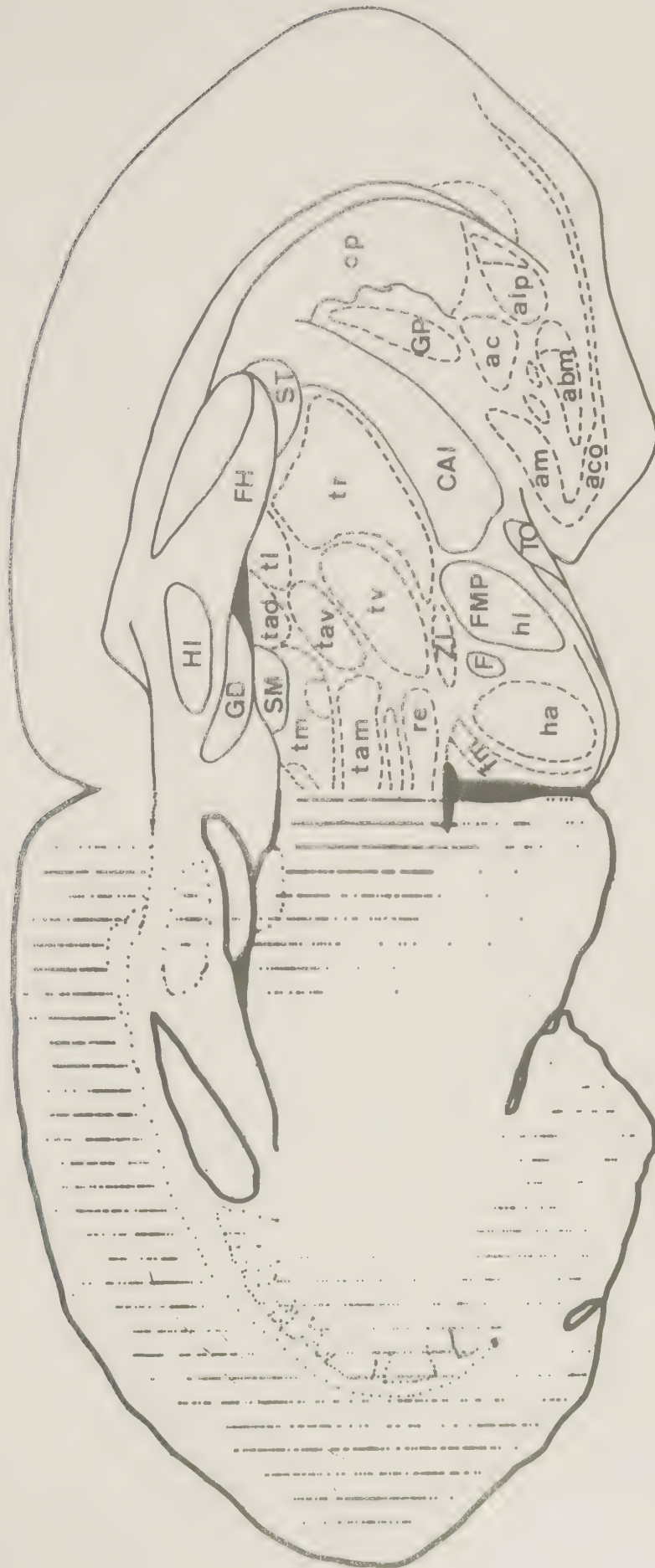
NIVEAU V INJECTION 12,5 JOURS



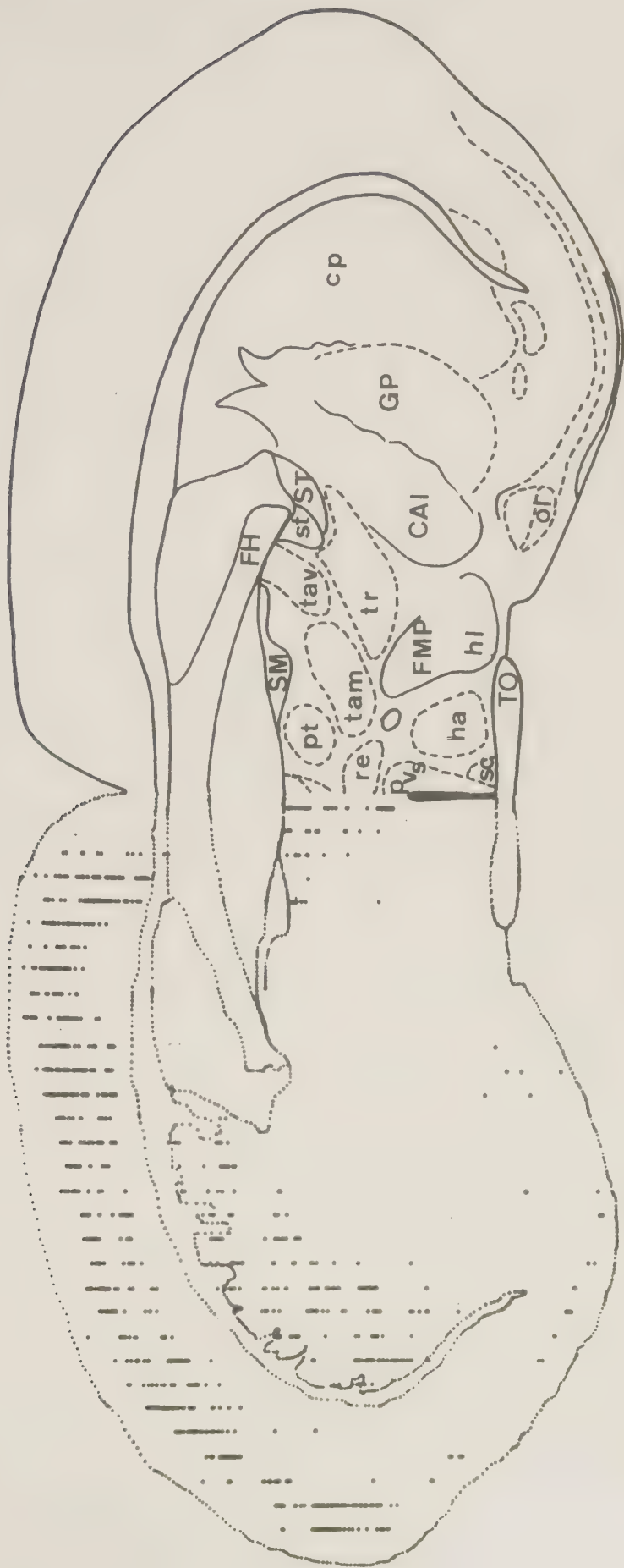
NIVEAU V INJECTION 135 JOURS



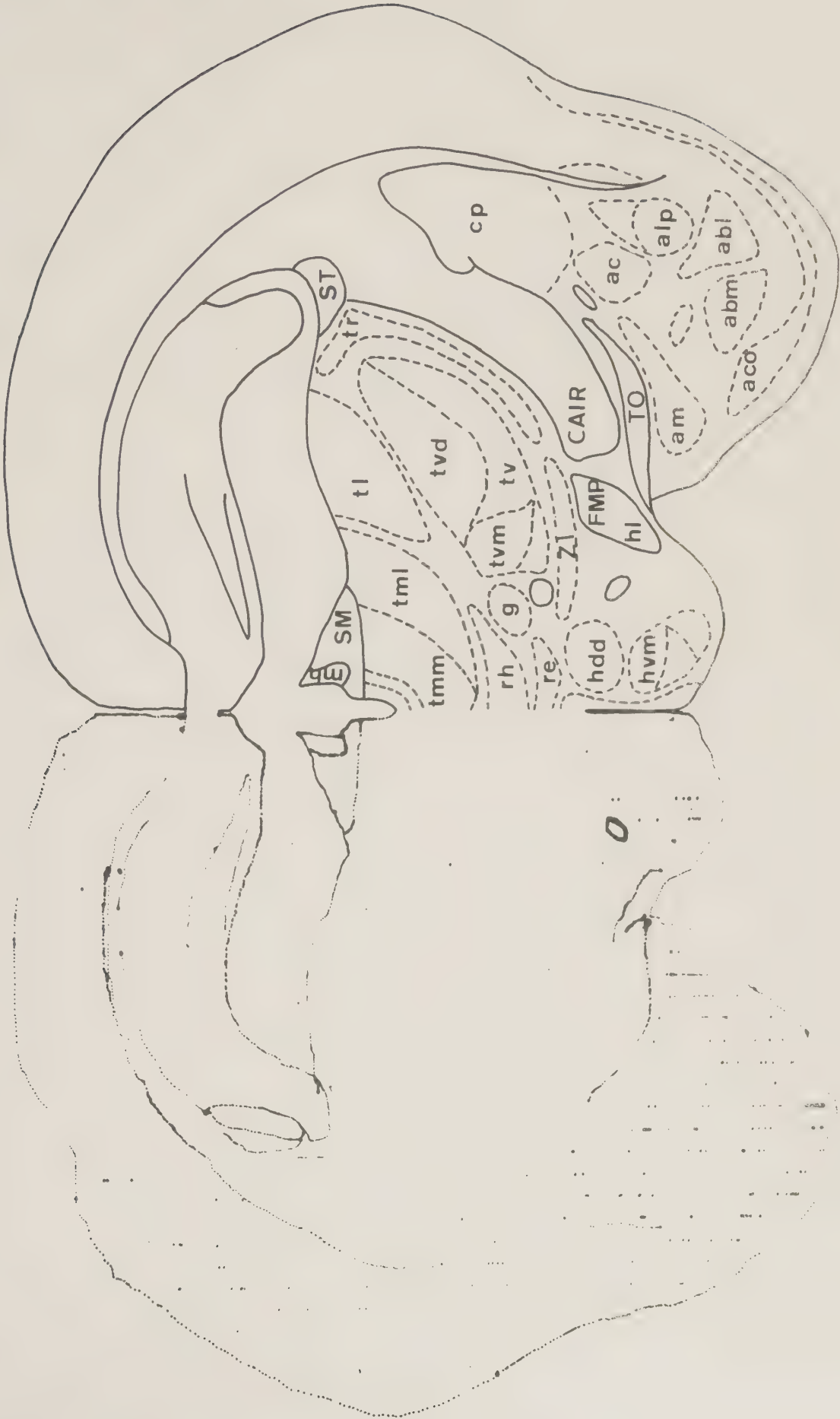
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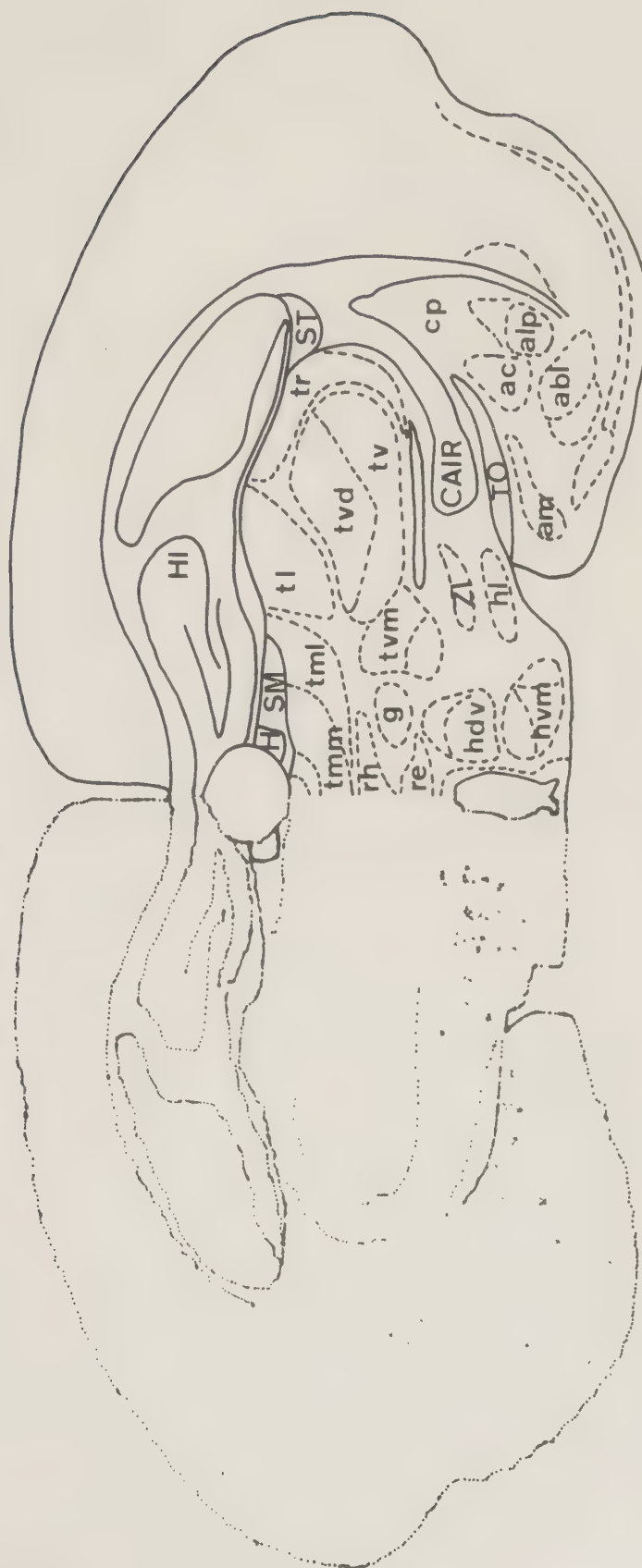
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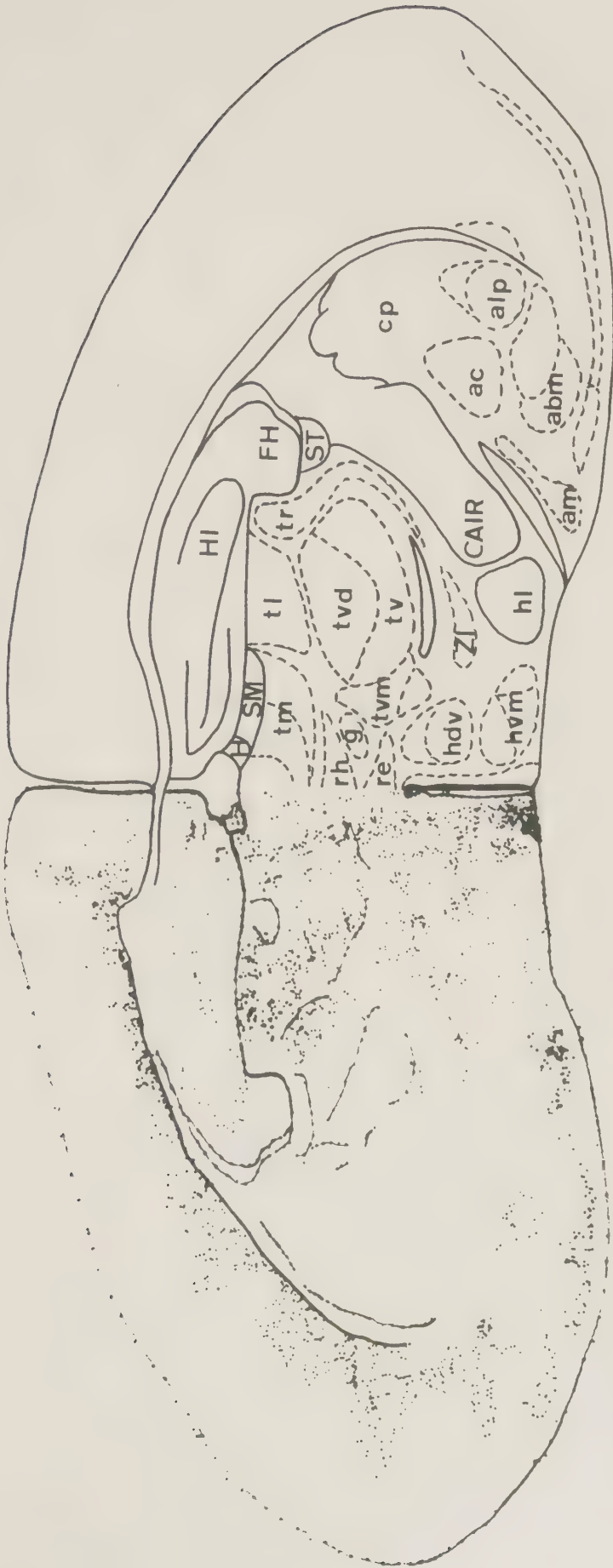
NIVEAU V INJECTION 16,5 JOURS



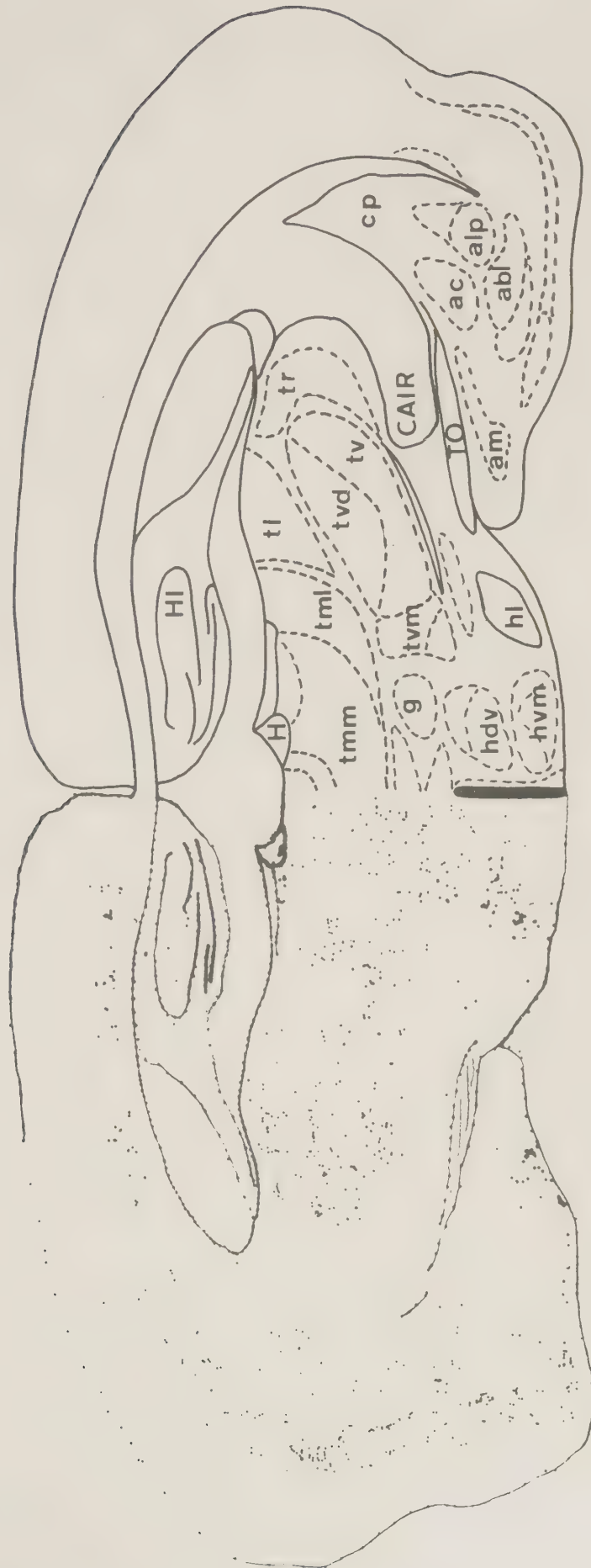
NIVEAU VI INJECTION 11,5 JOURS



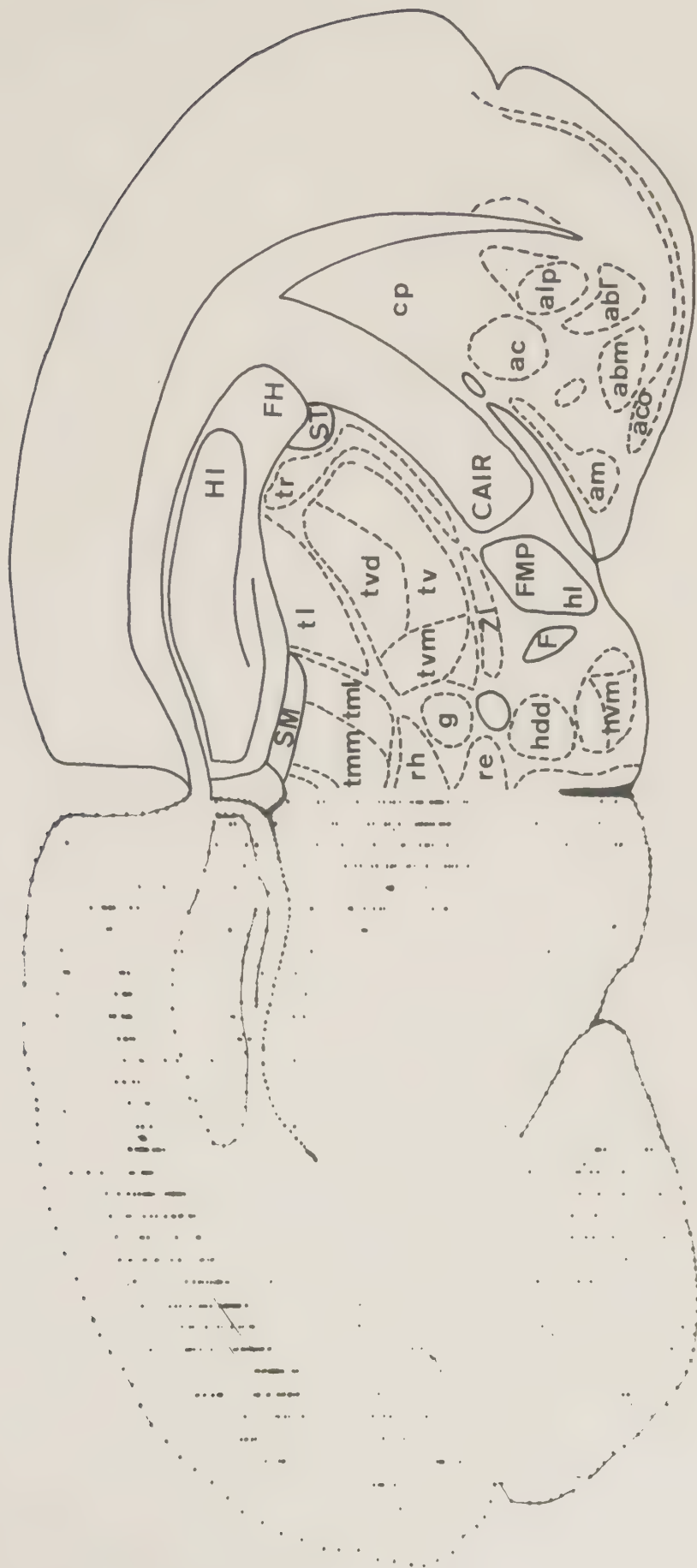
NIVEAU VI INJECTION 12,5 JOURS



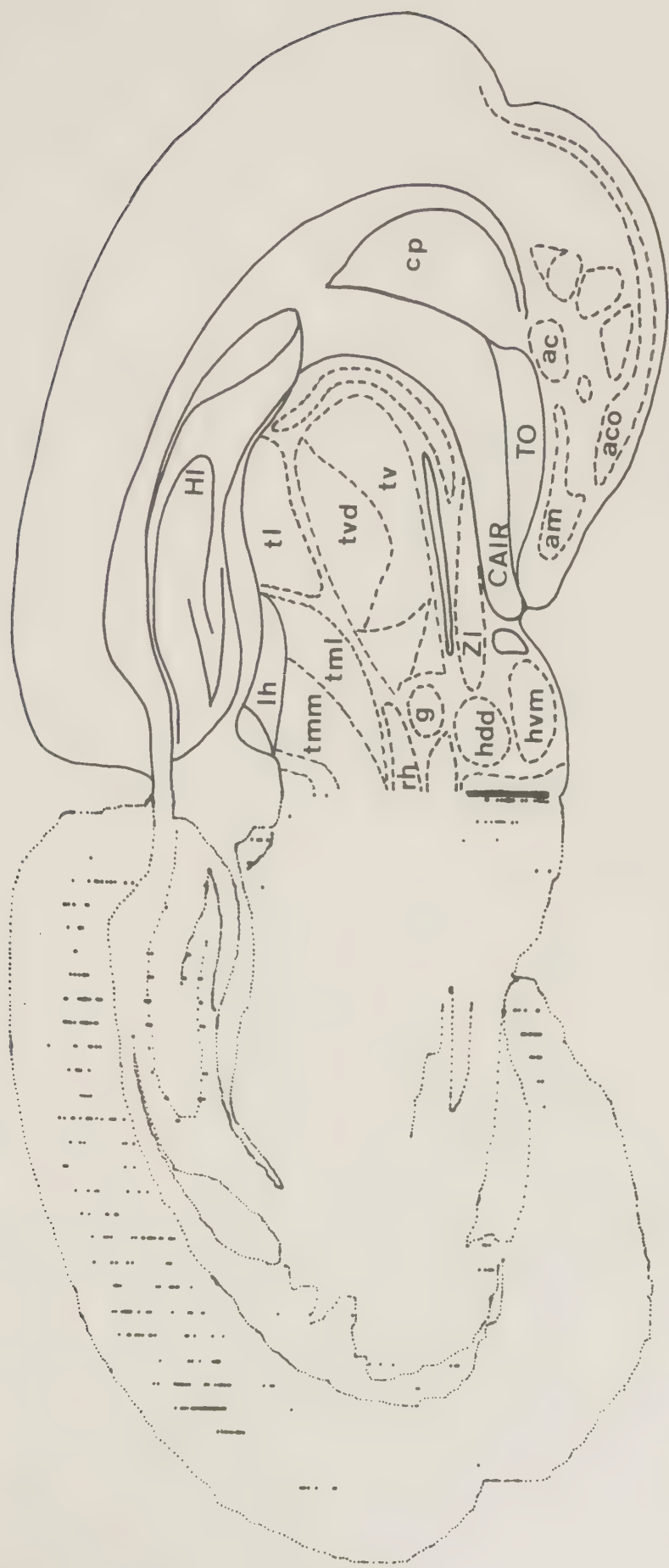
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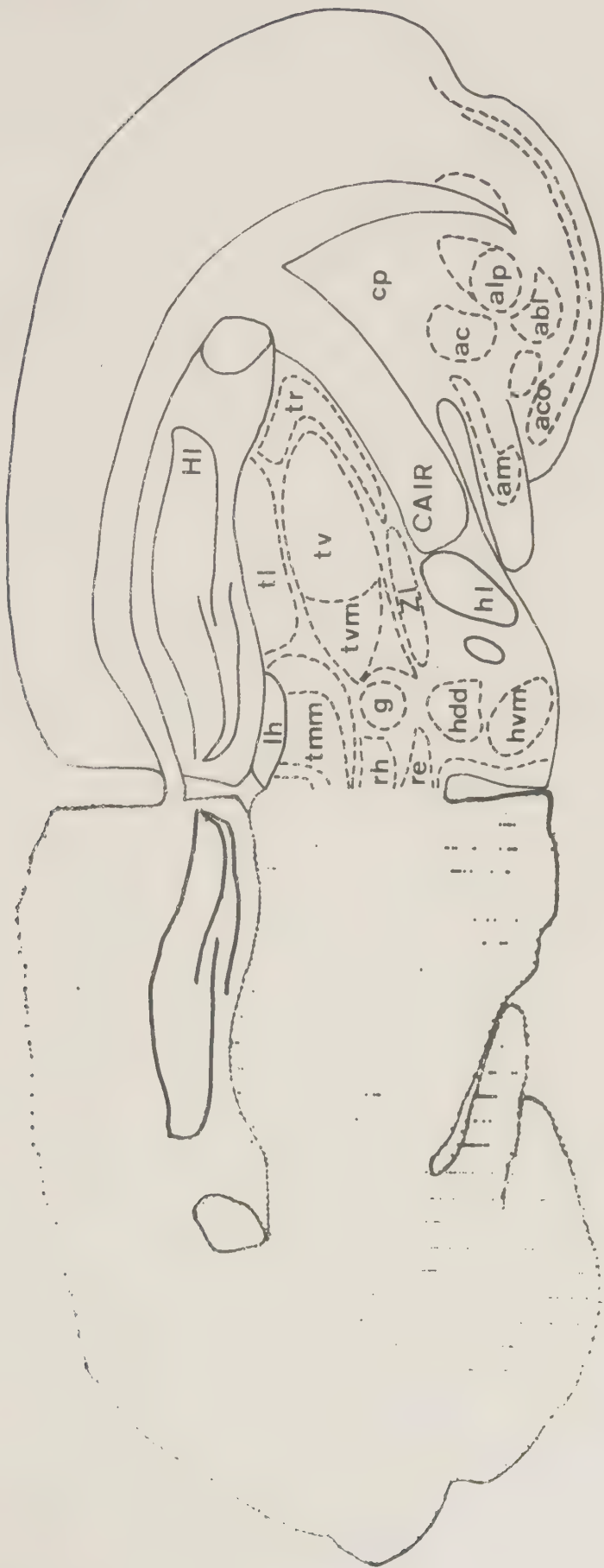
NIVEAU VI INJECTION 14.5 JOURS



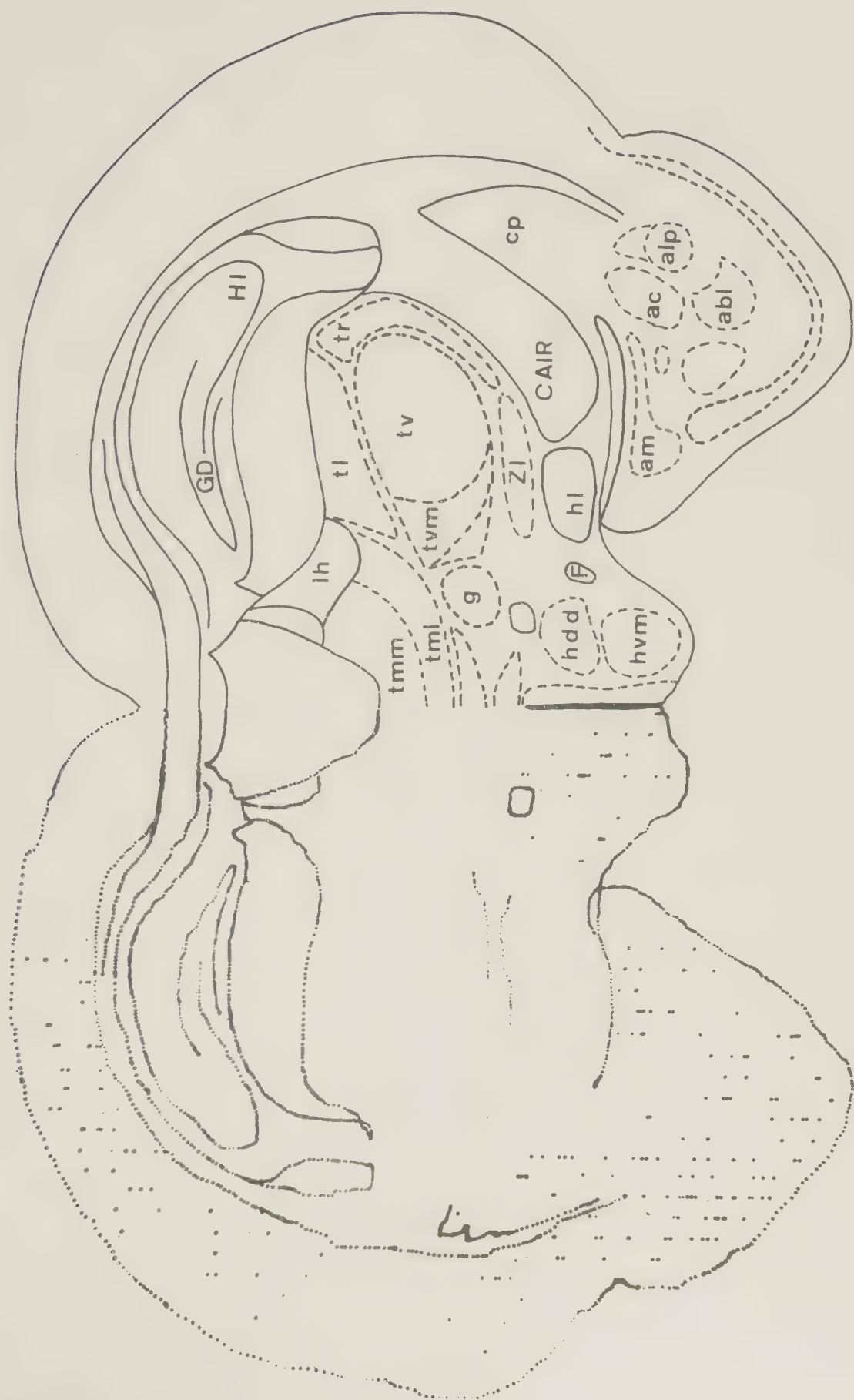
NIVEAU VI INJECTION 155 JOURS



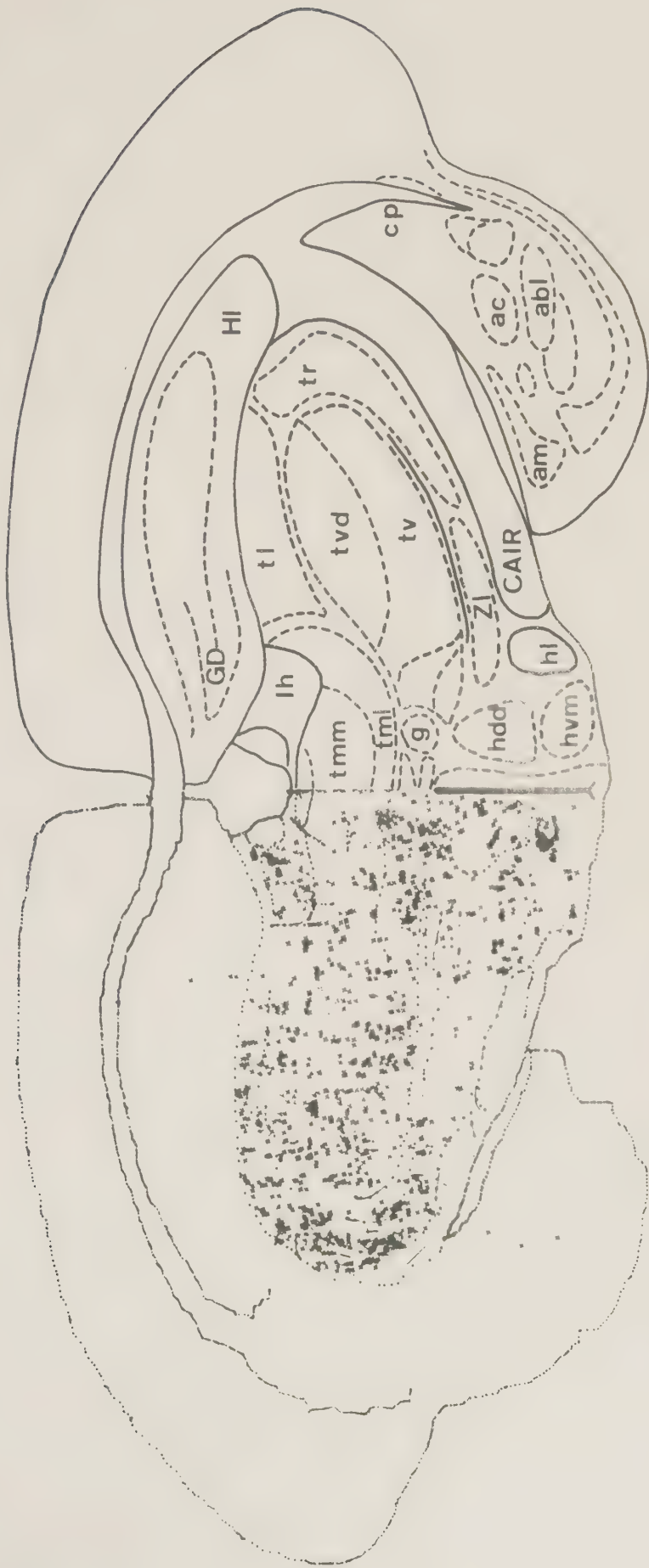
NIVEAU VI INJECTION 16,5 JOURS



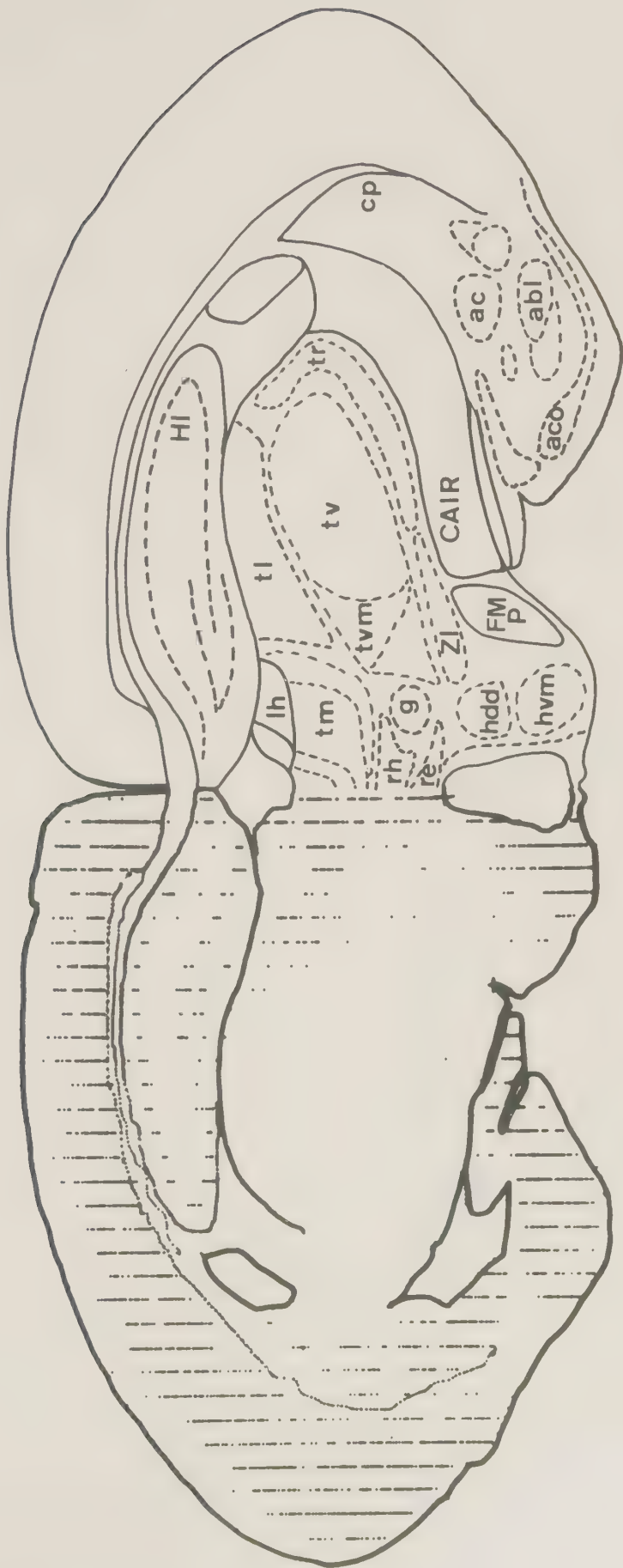
NIVEAU VII INJECTION 11,5 JOURS



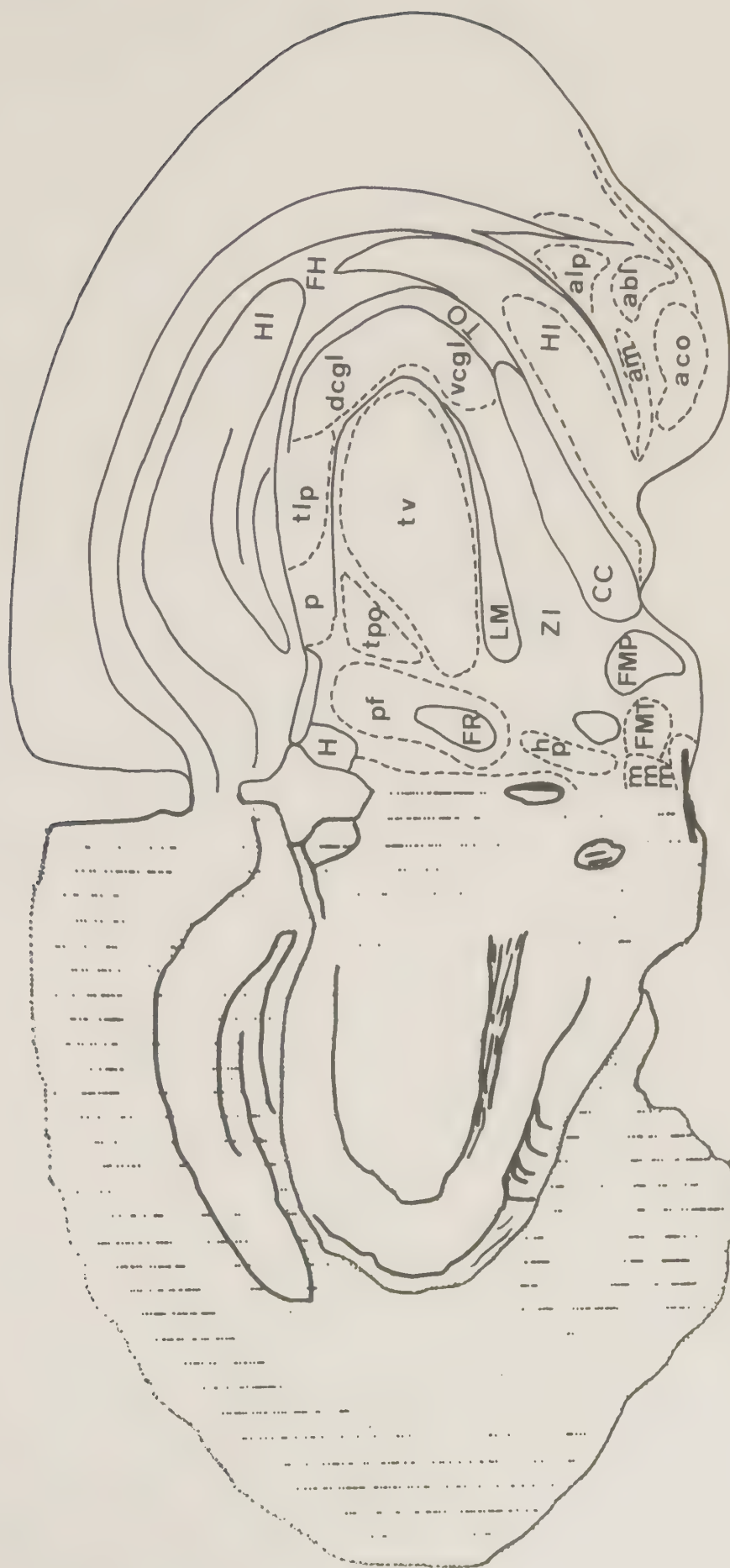
NIVEAU VII INJECTION 12,5 JOURS



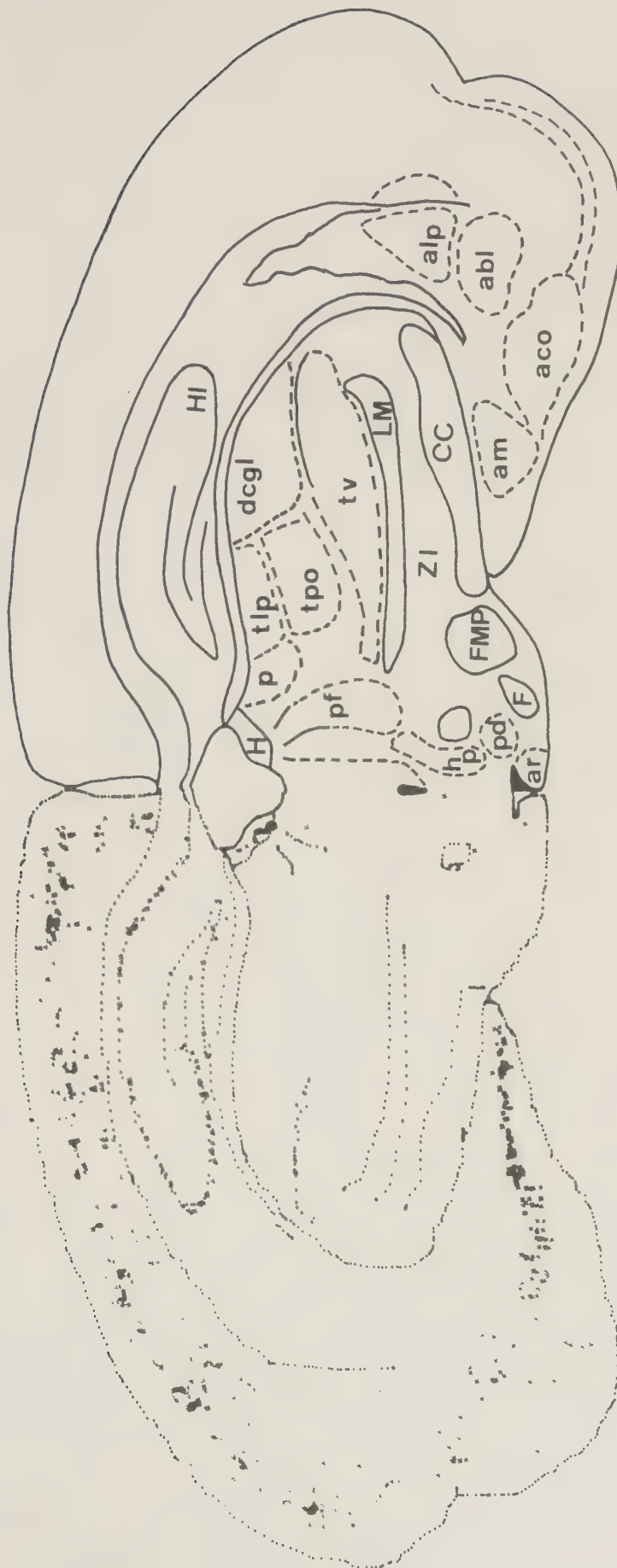
NIVEAU VII INJECTION 135 JOURS



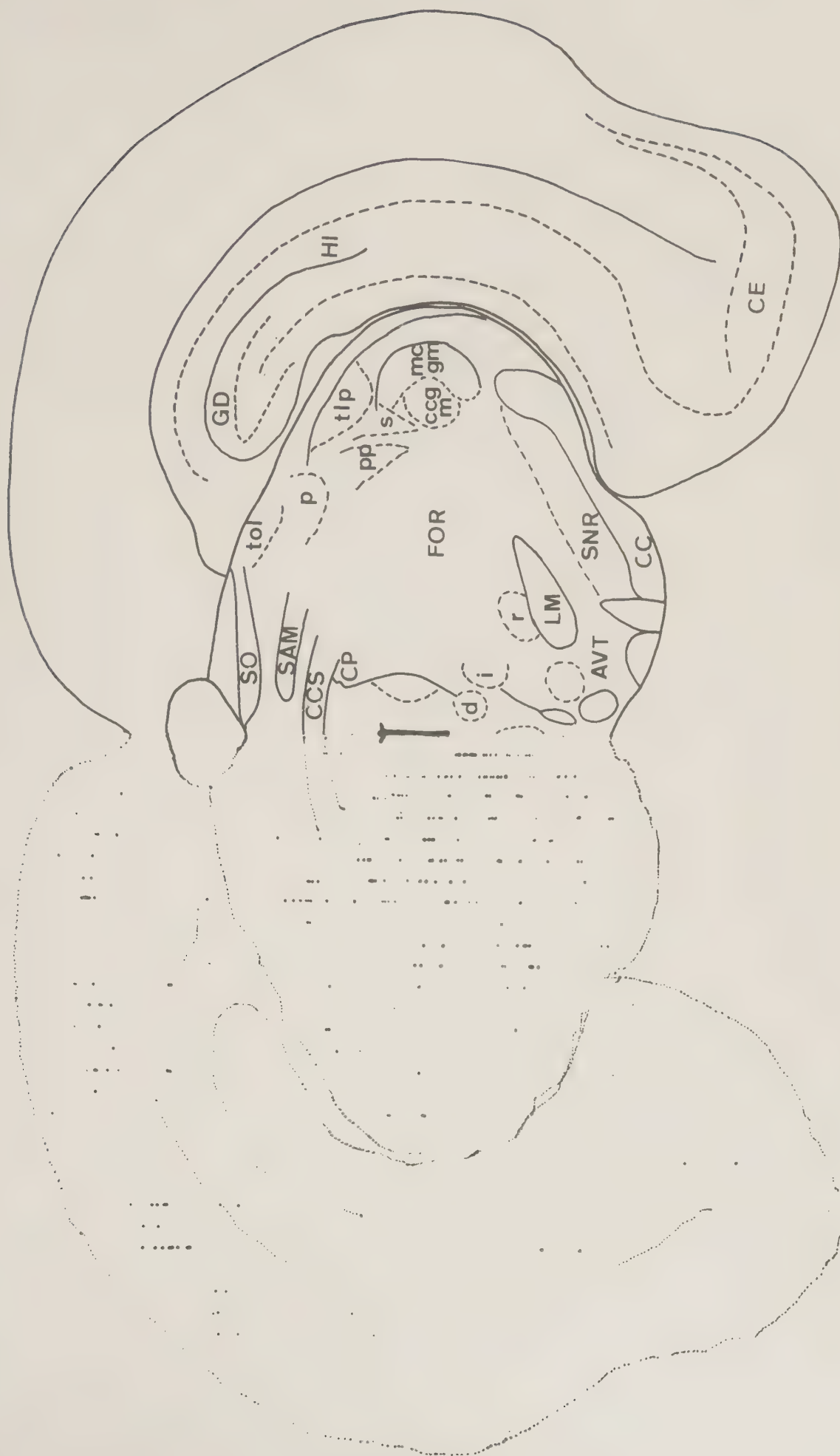
NIVEAU VII INJECTION 14,5 JOURS



NIVEAU VII	INJECTION	15,5	JOURS
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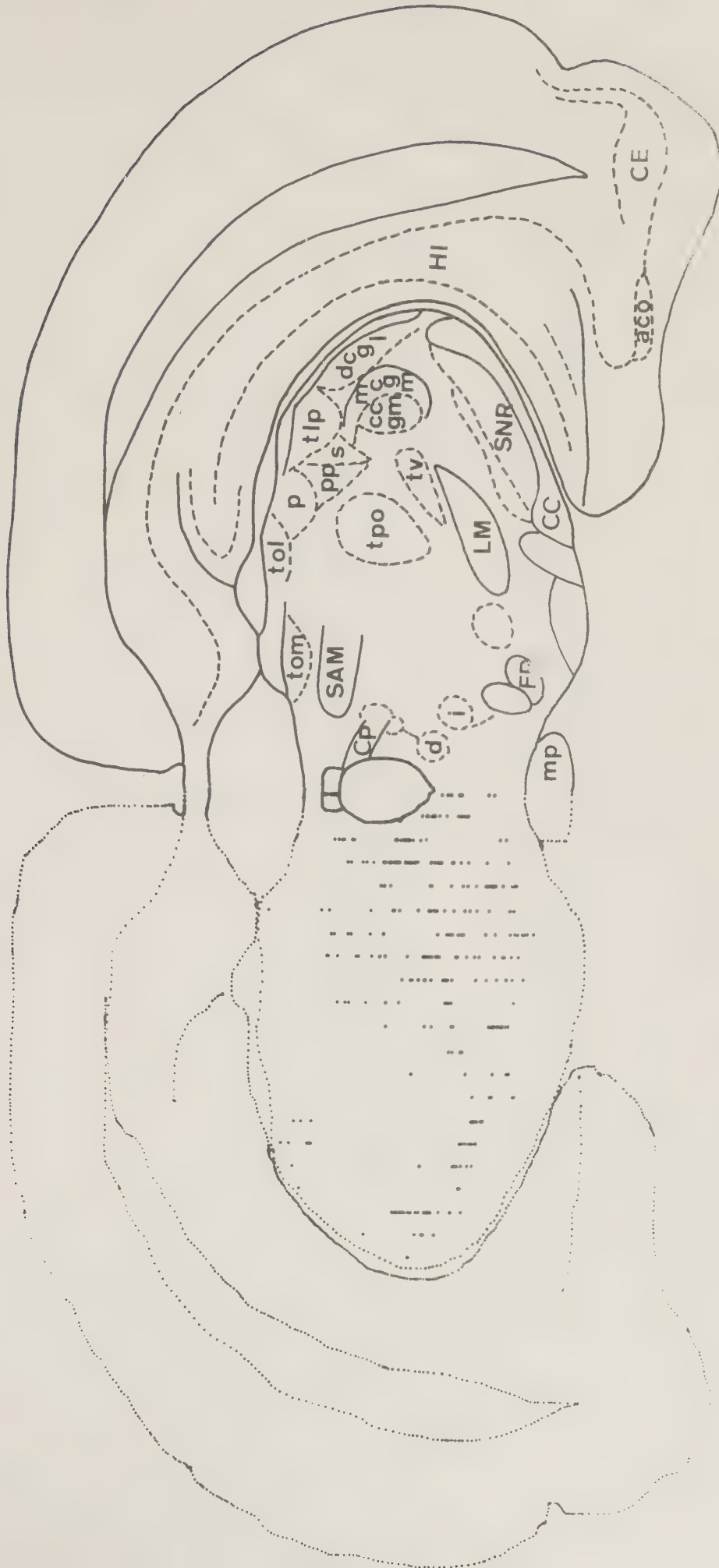


NIVEAU VII INJECTION 16,5 JOURS



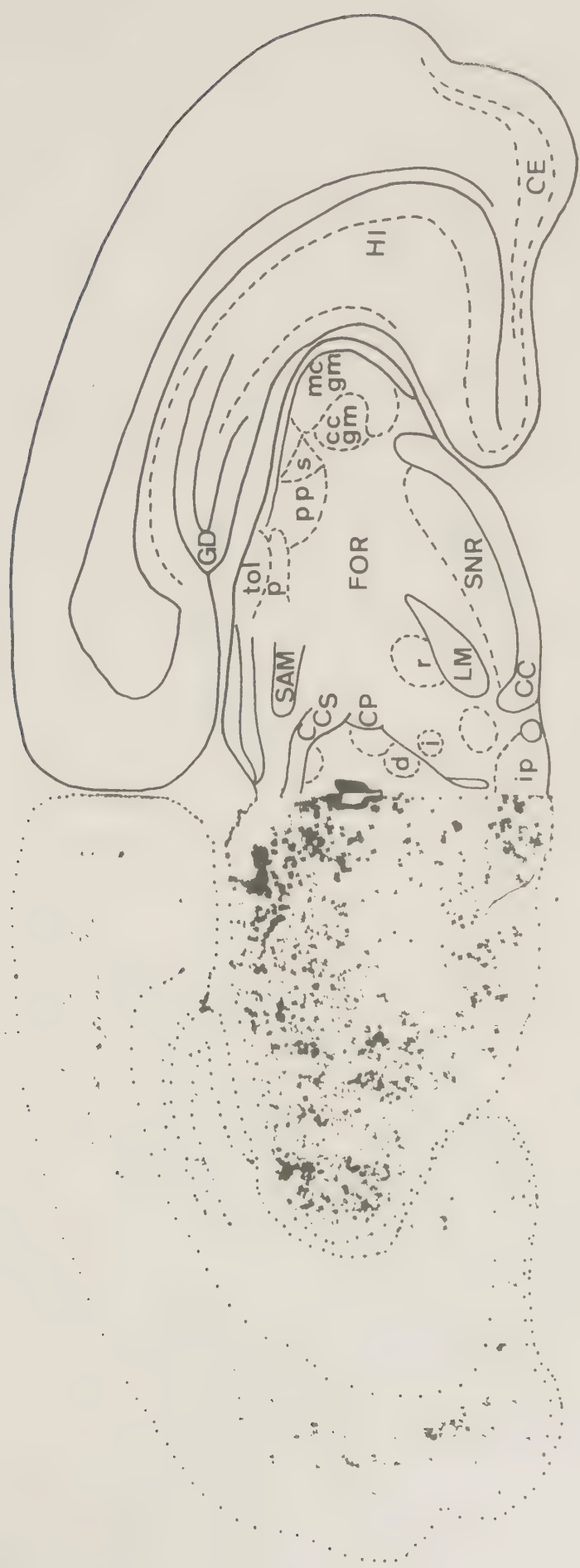
INJECTION 11,5 JOURS

NIVEAU VIII

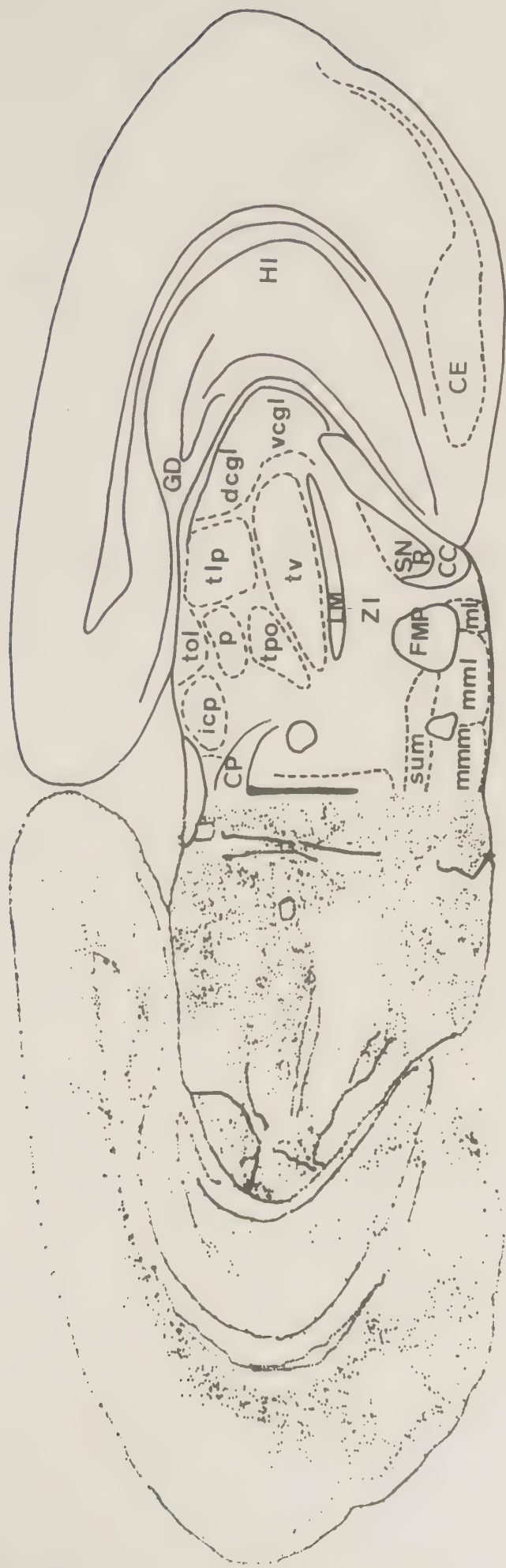


INJECTION 12.5 JOURS

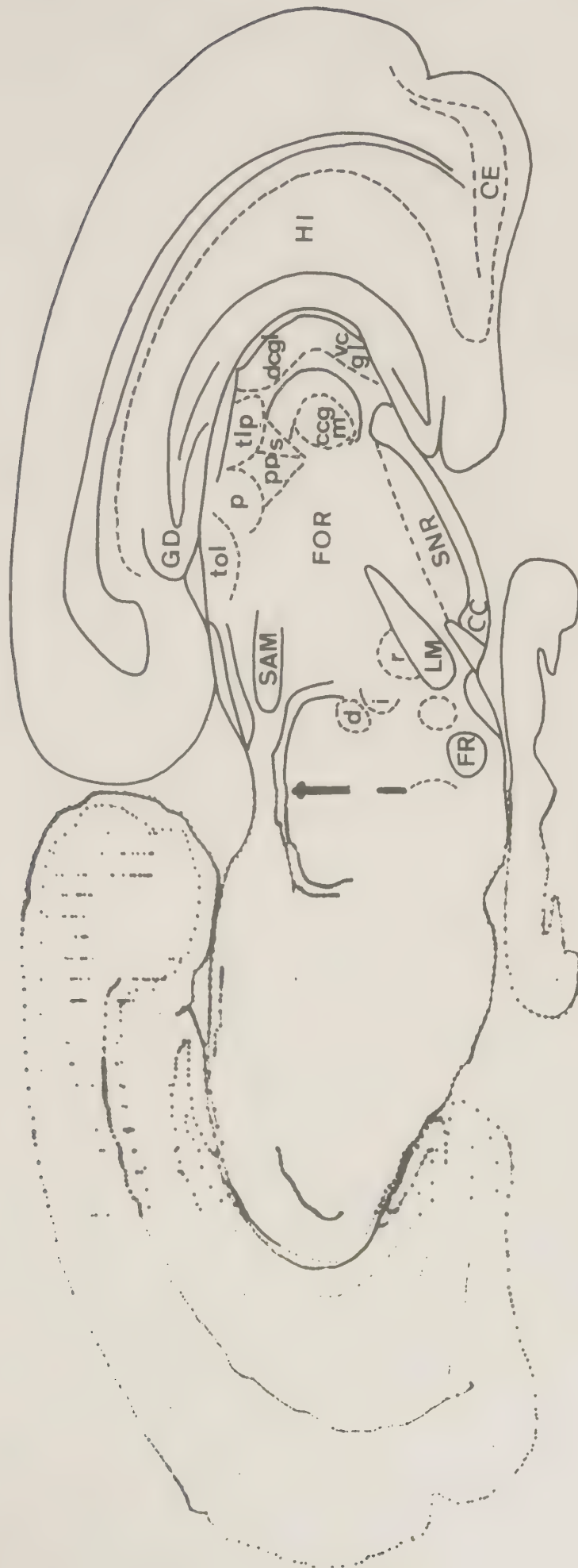
NIVEAU VIII

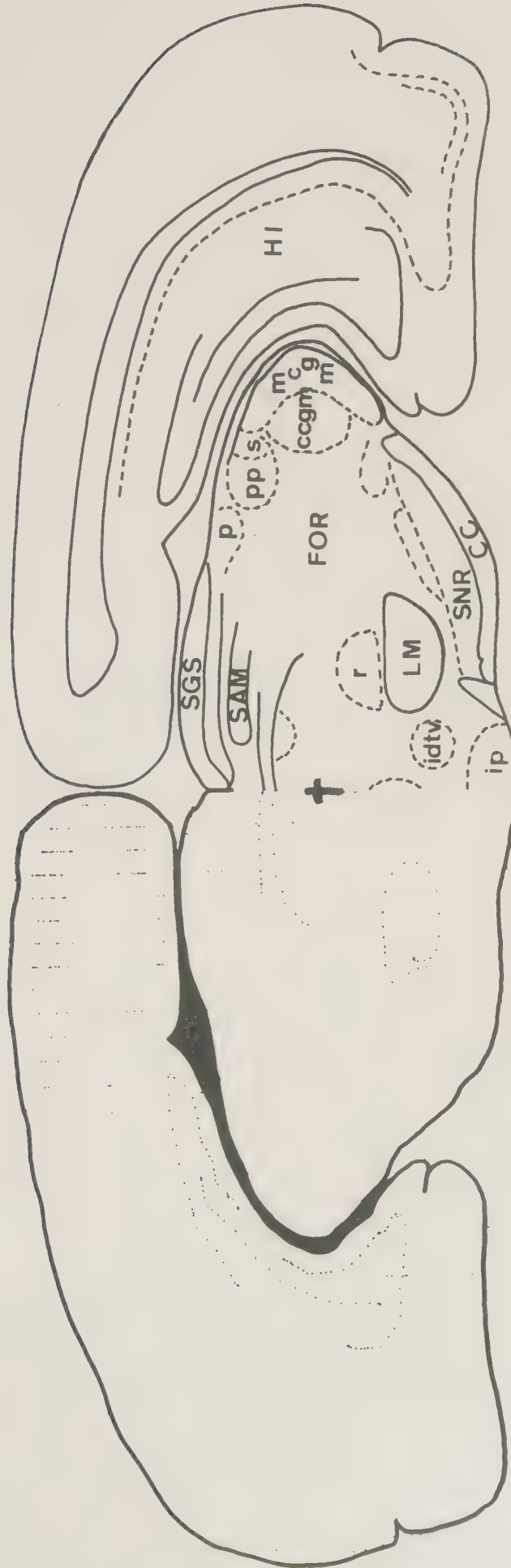


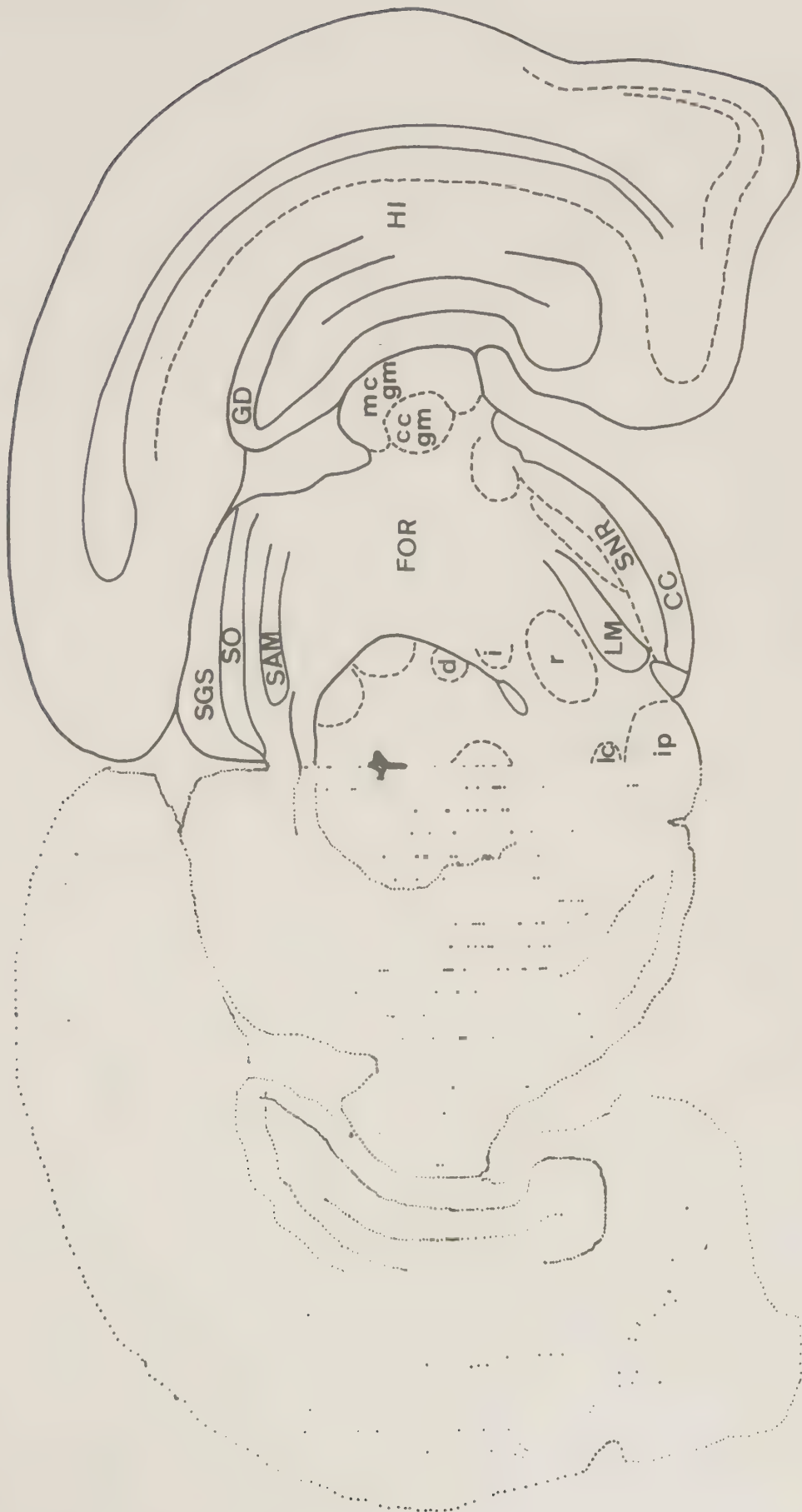
NIVEAU VIII INJECTION 135 JOURS

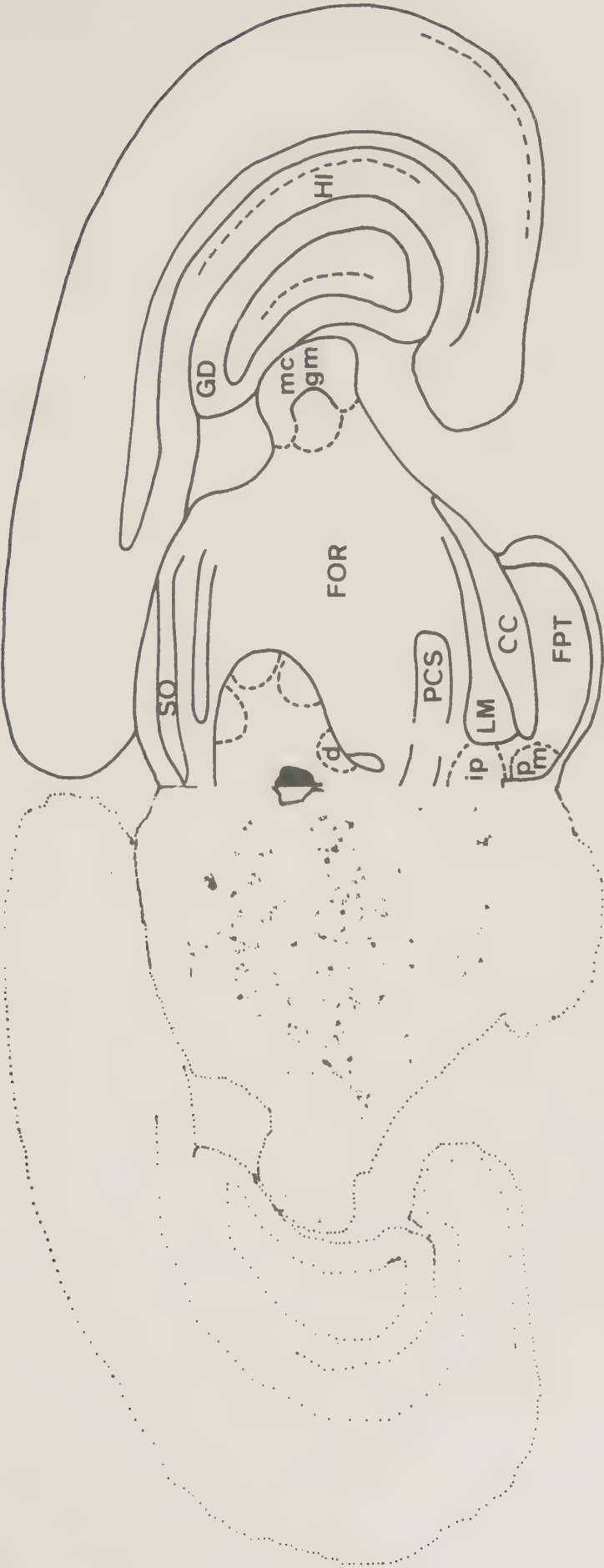


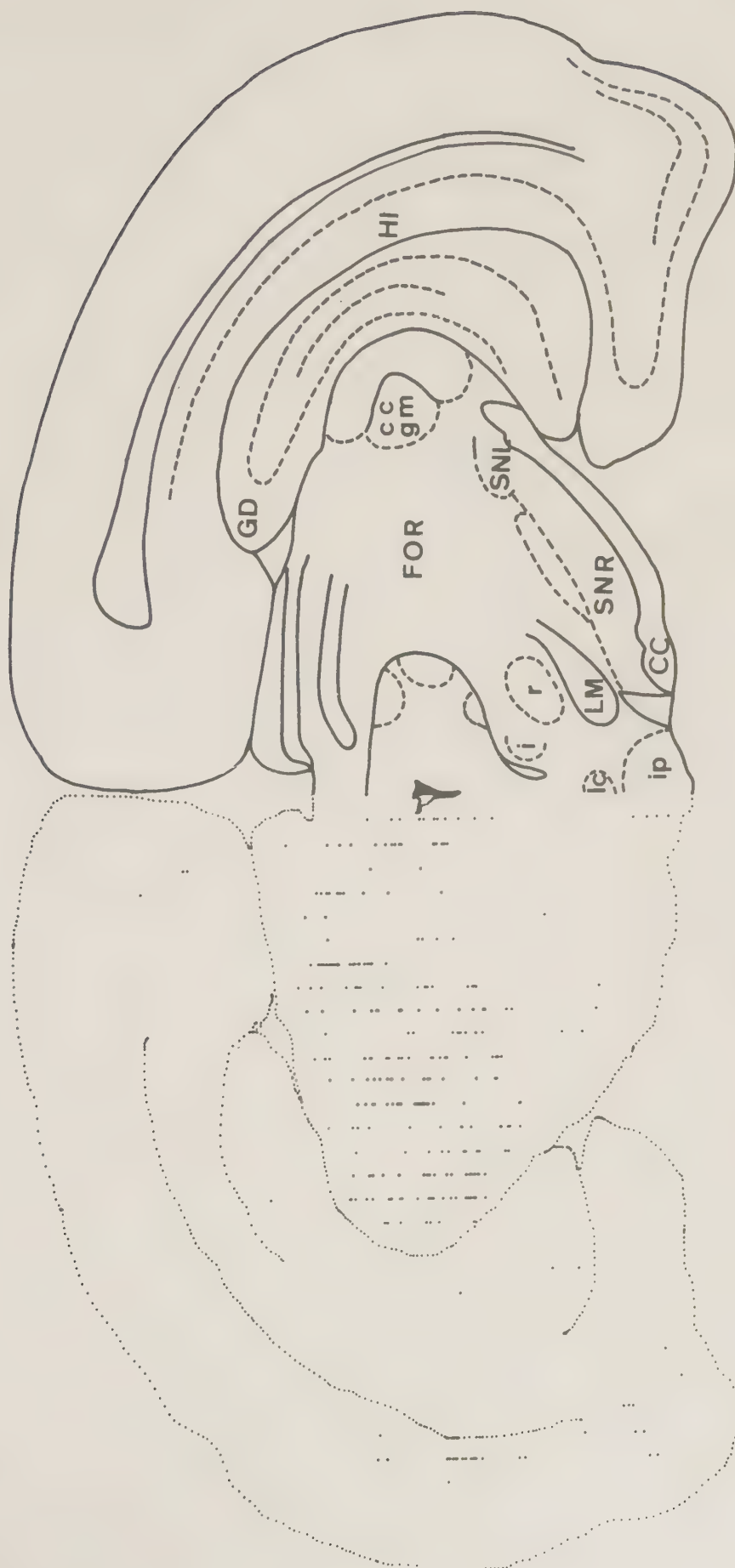
NIVEAU VIII INJECTION 14,5 JOURS



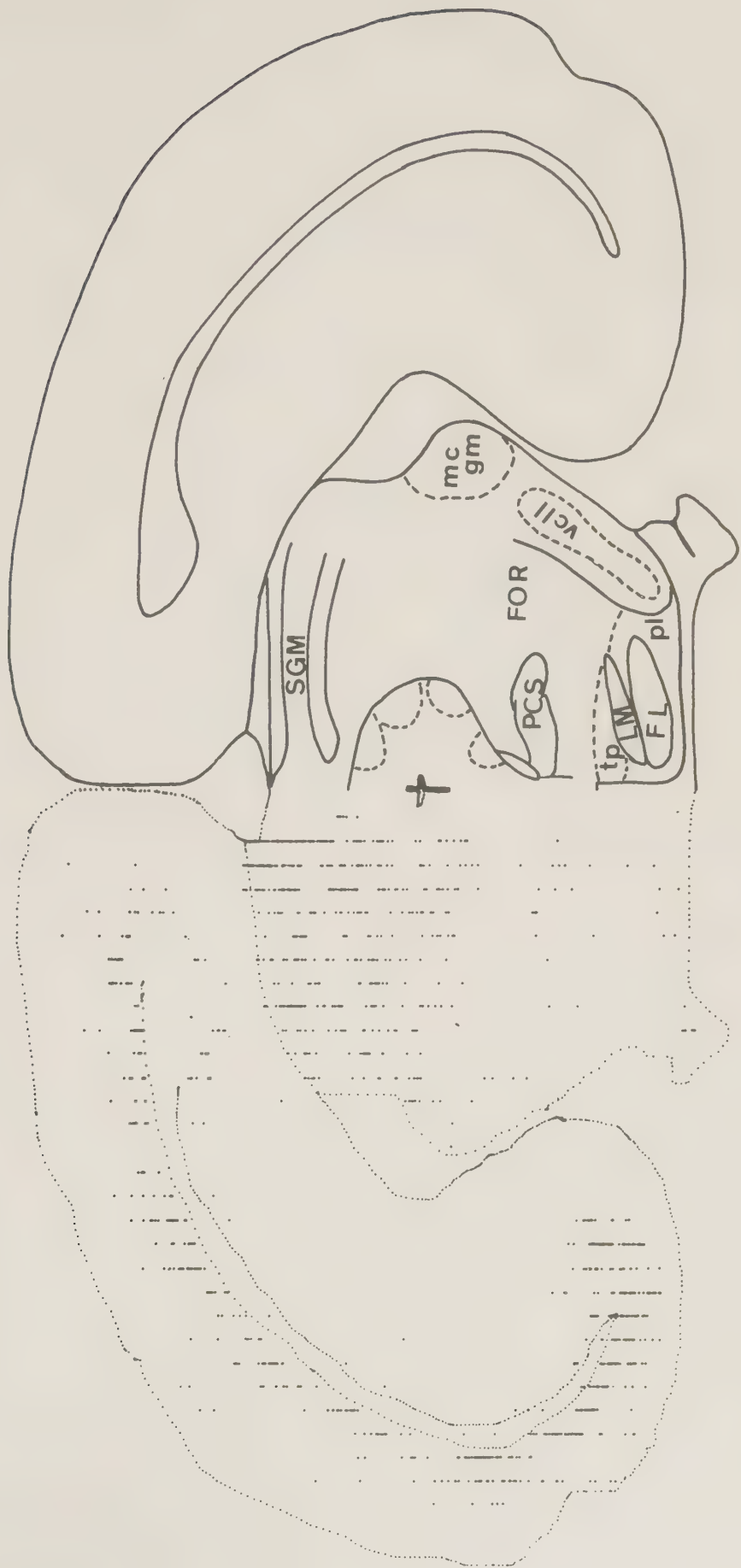


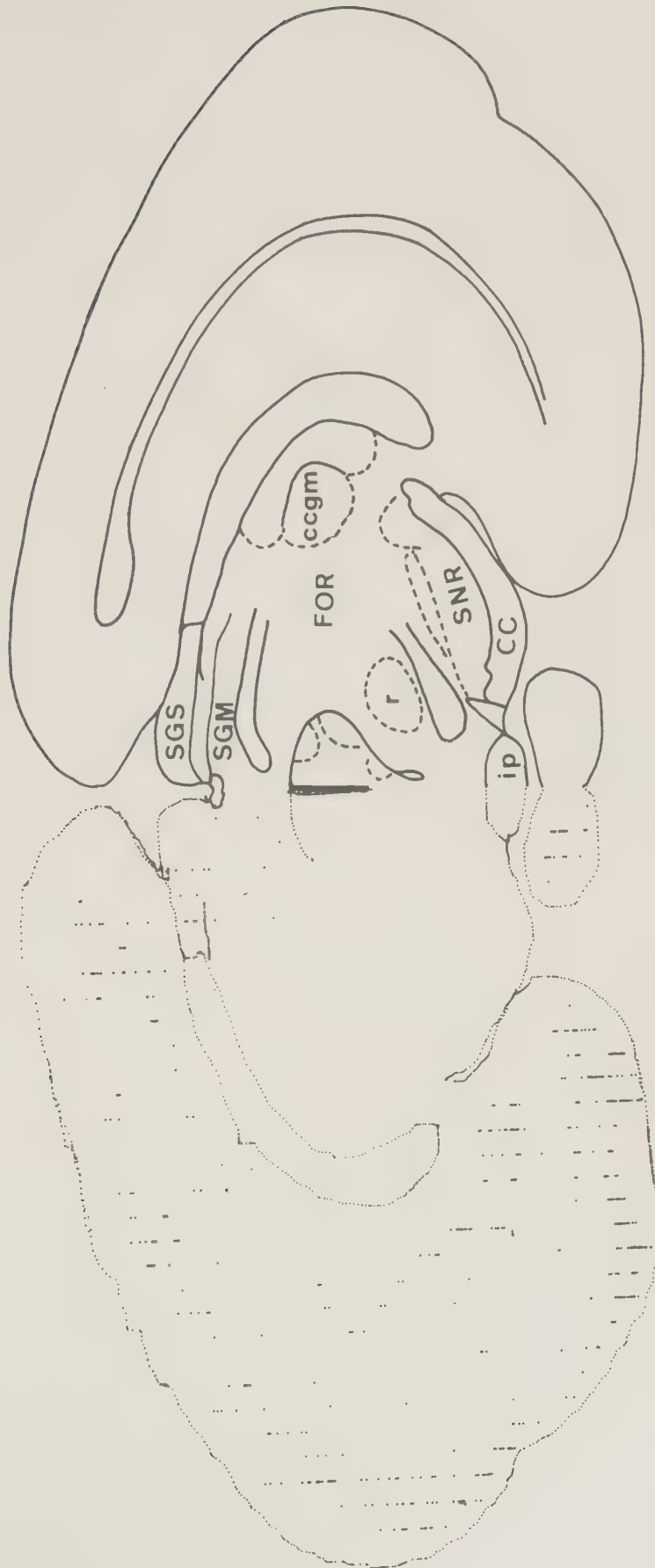




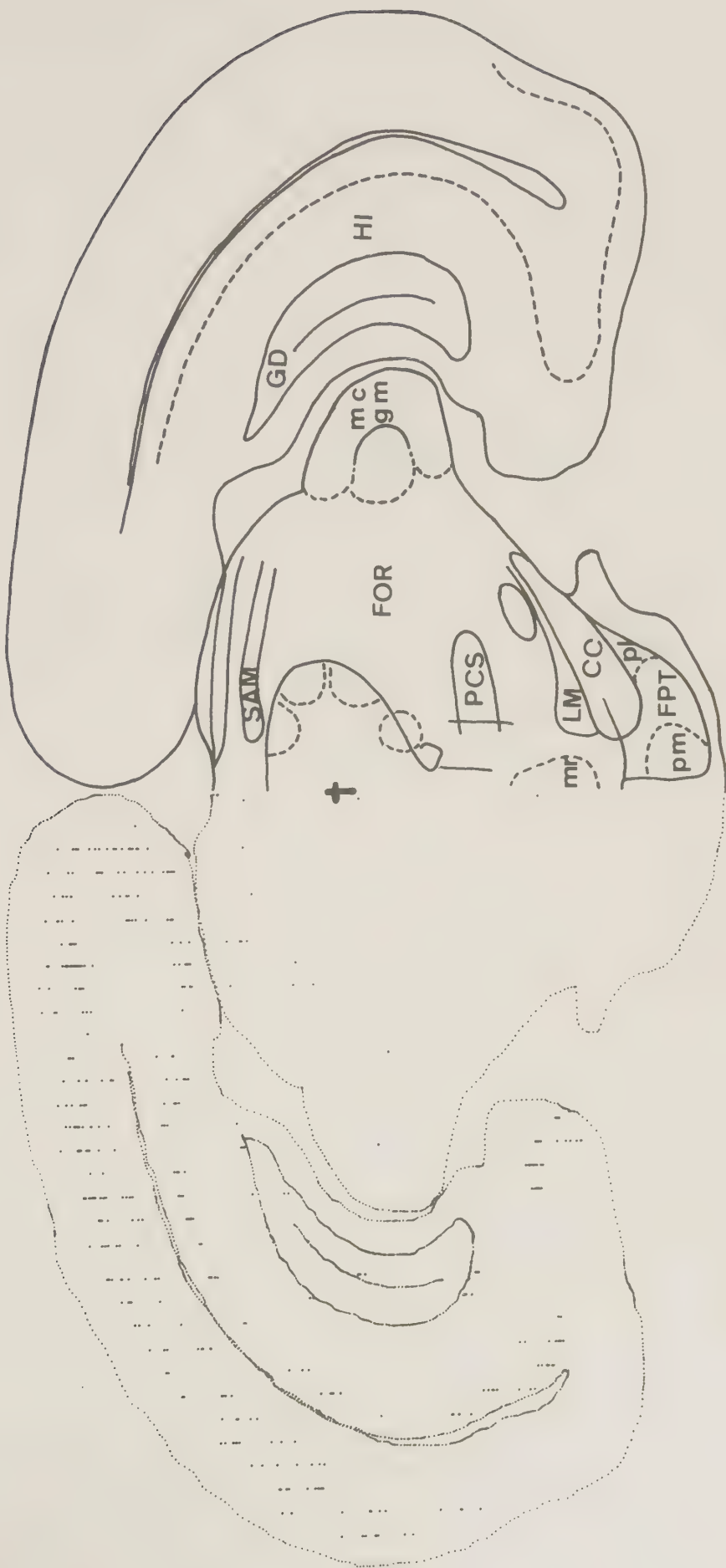


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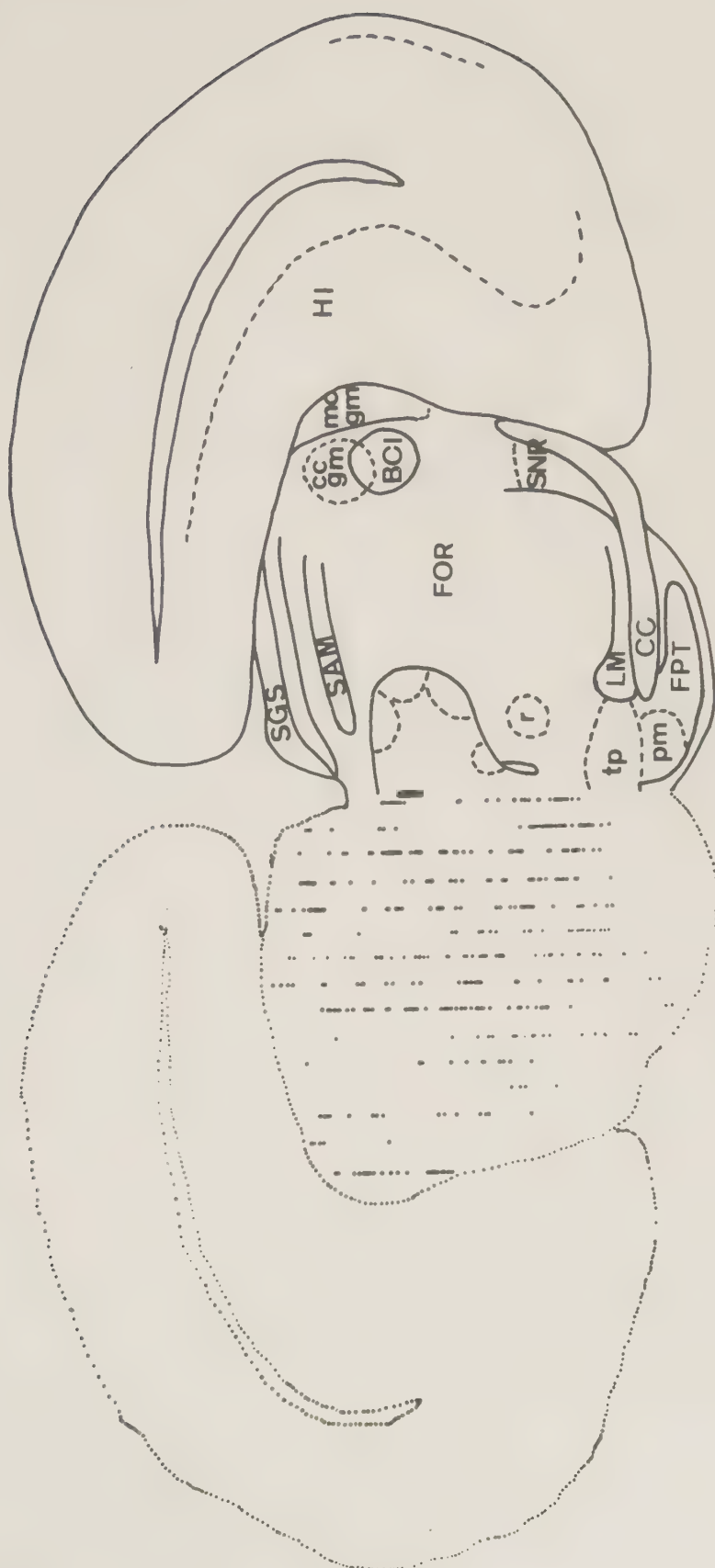




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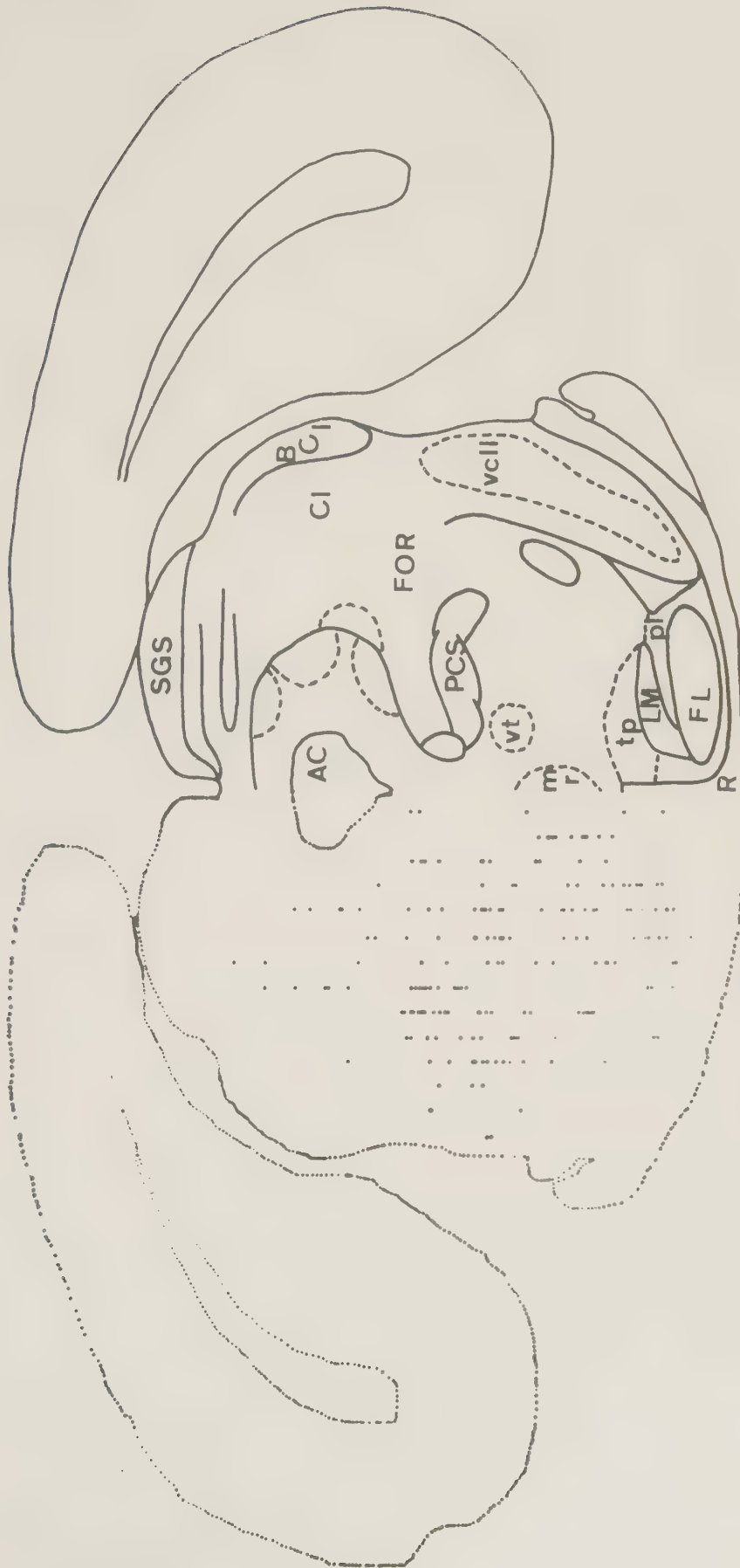


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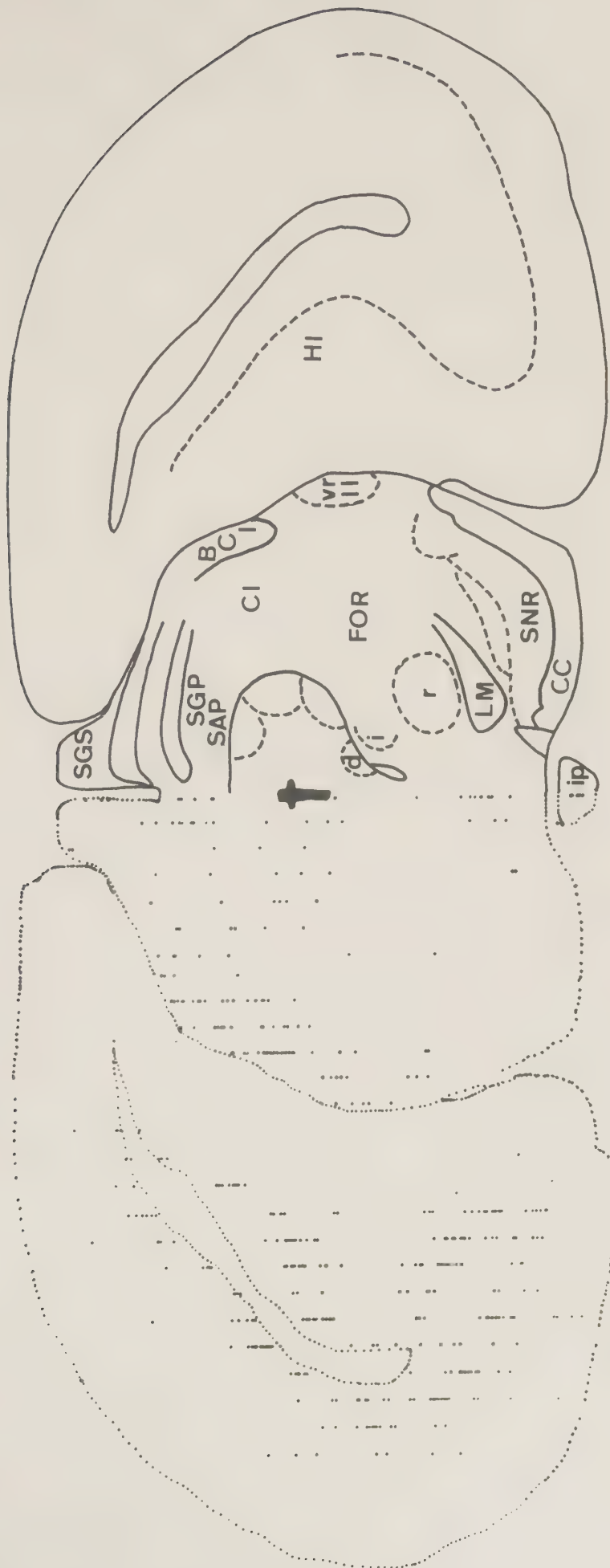


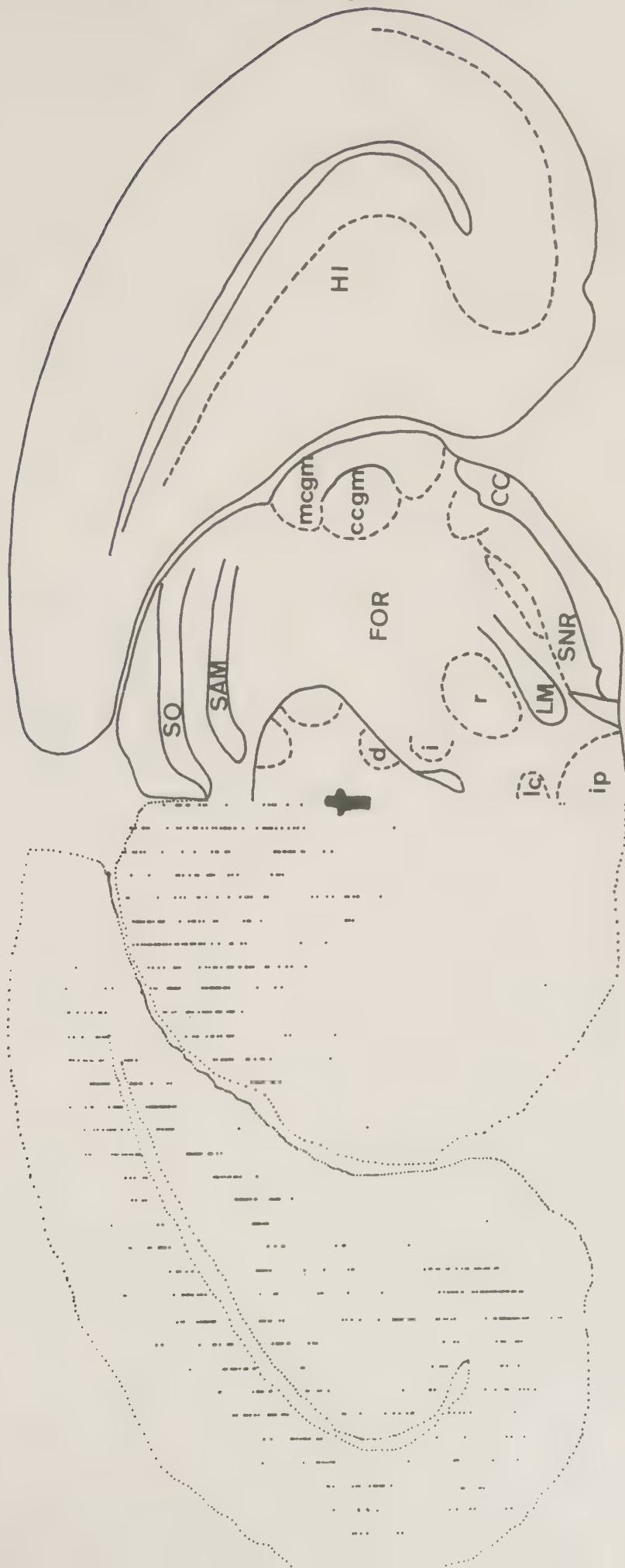
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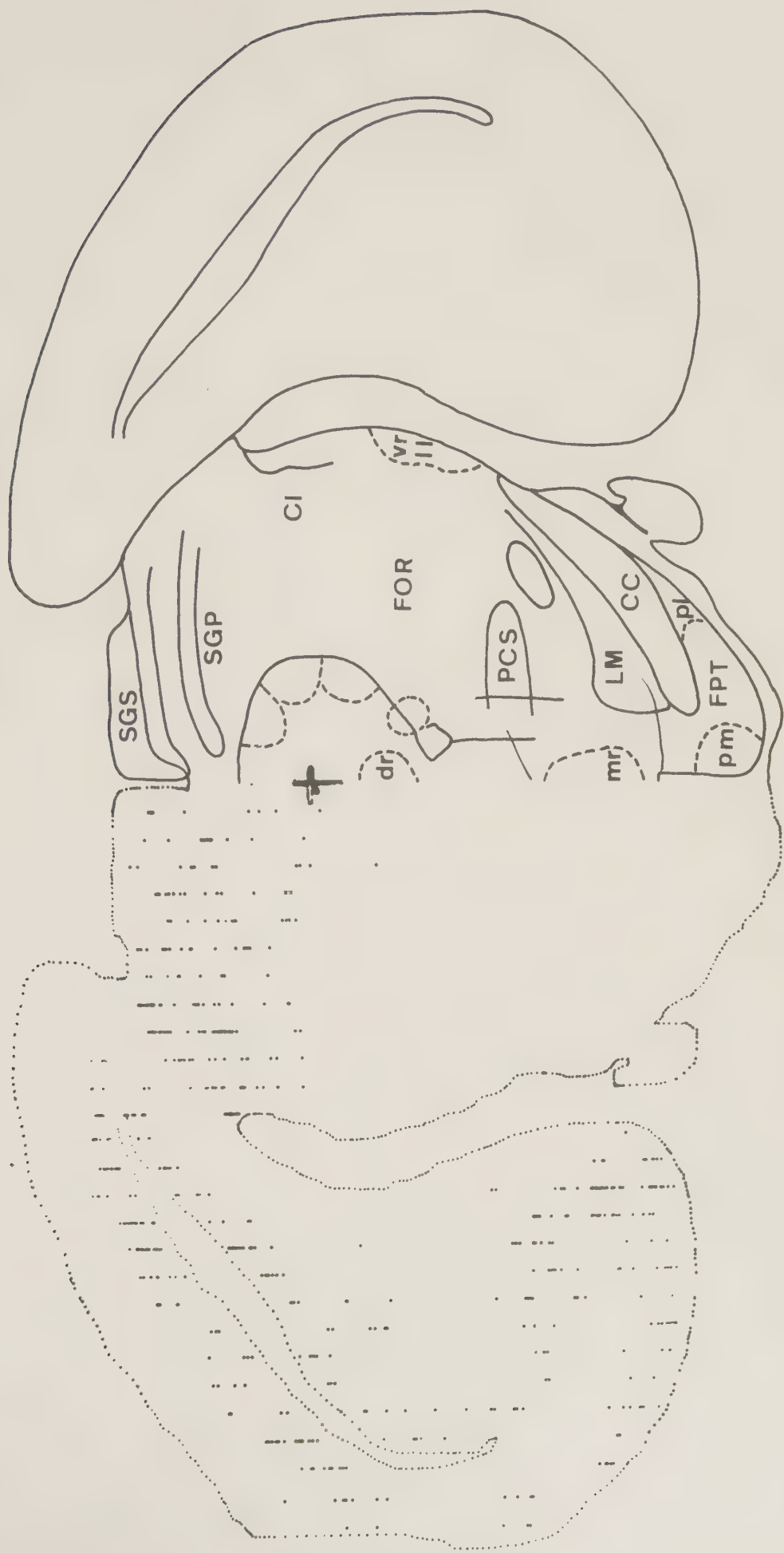
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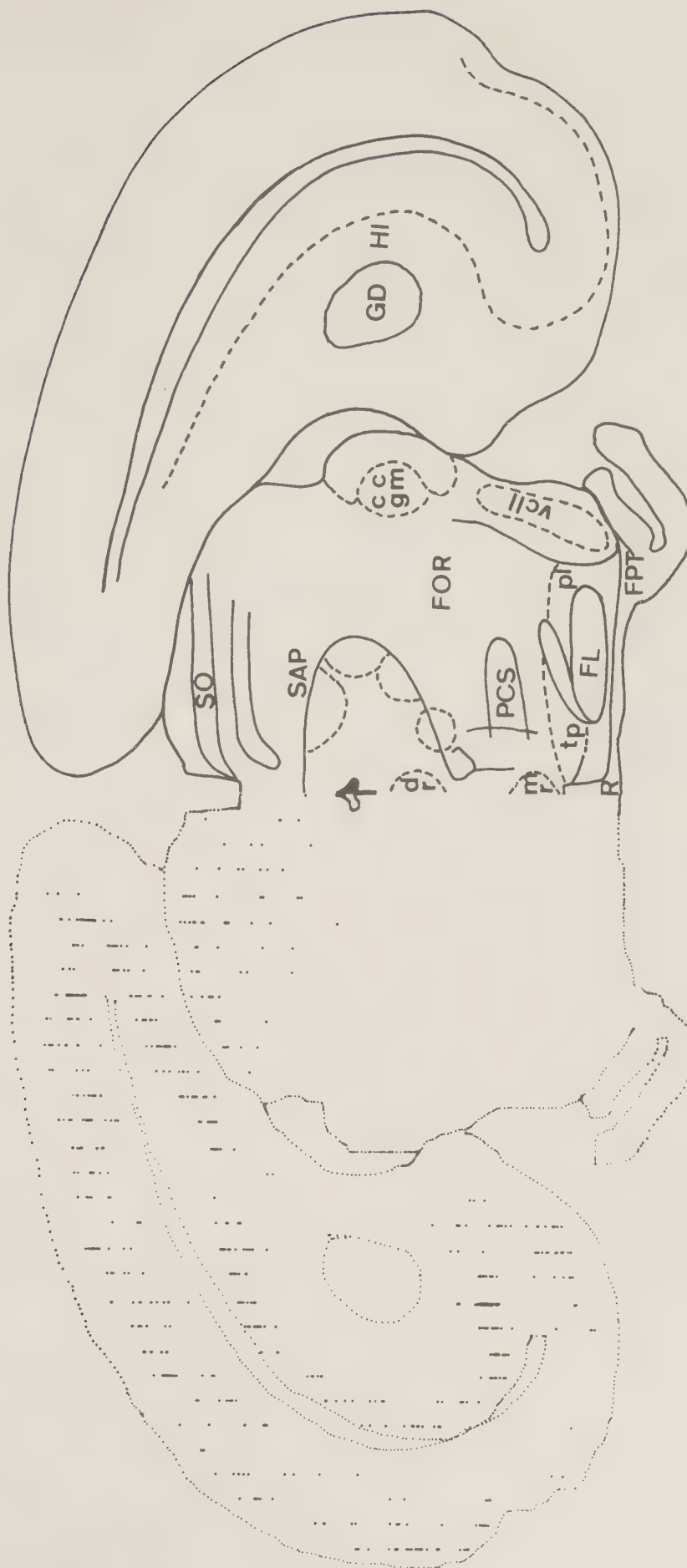
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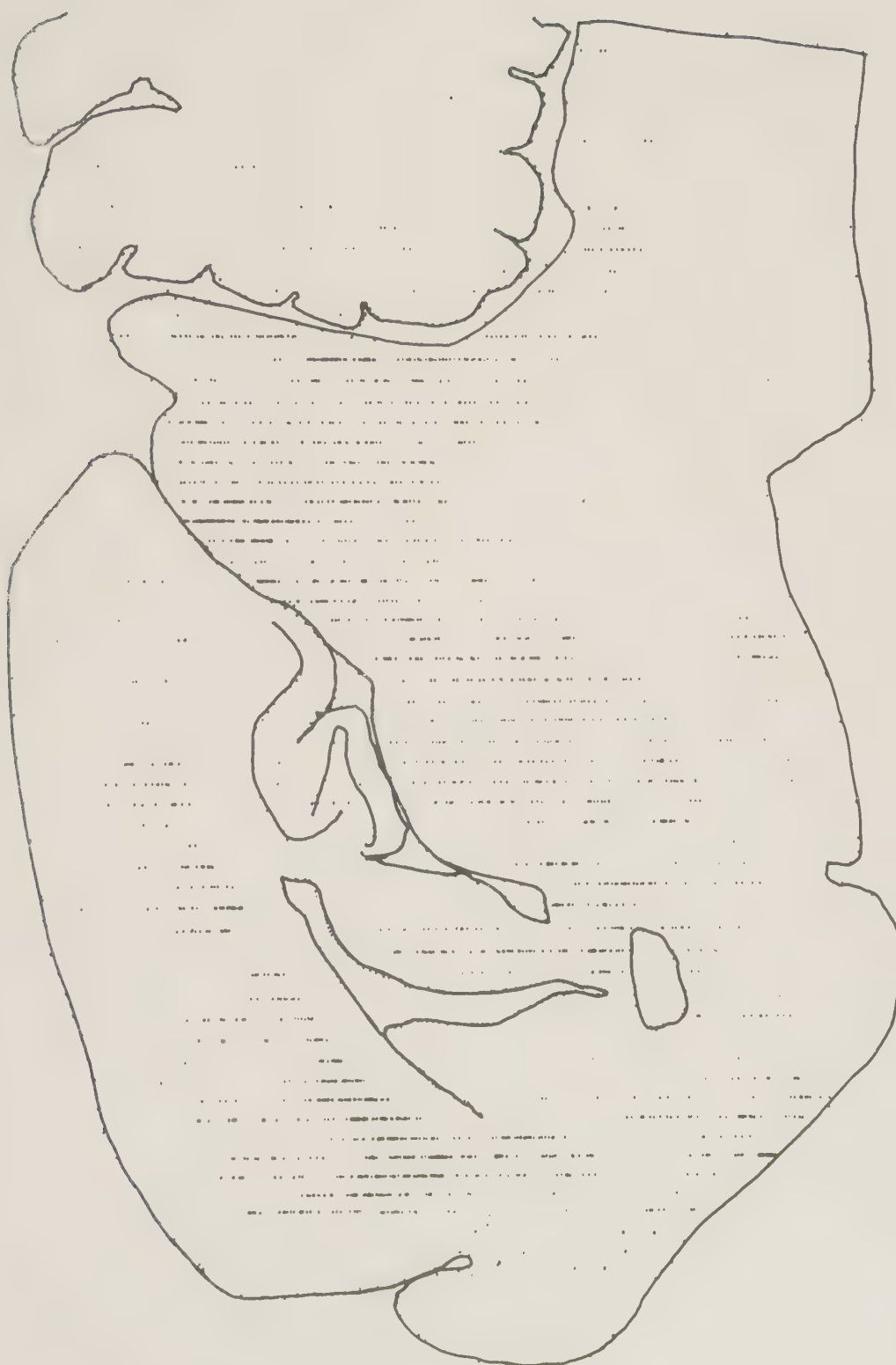
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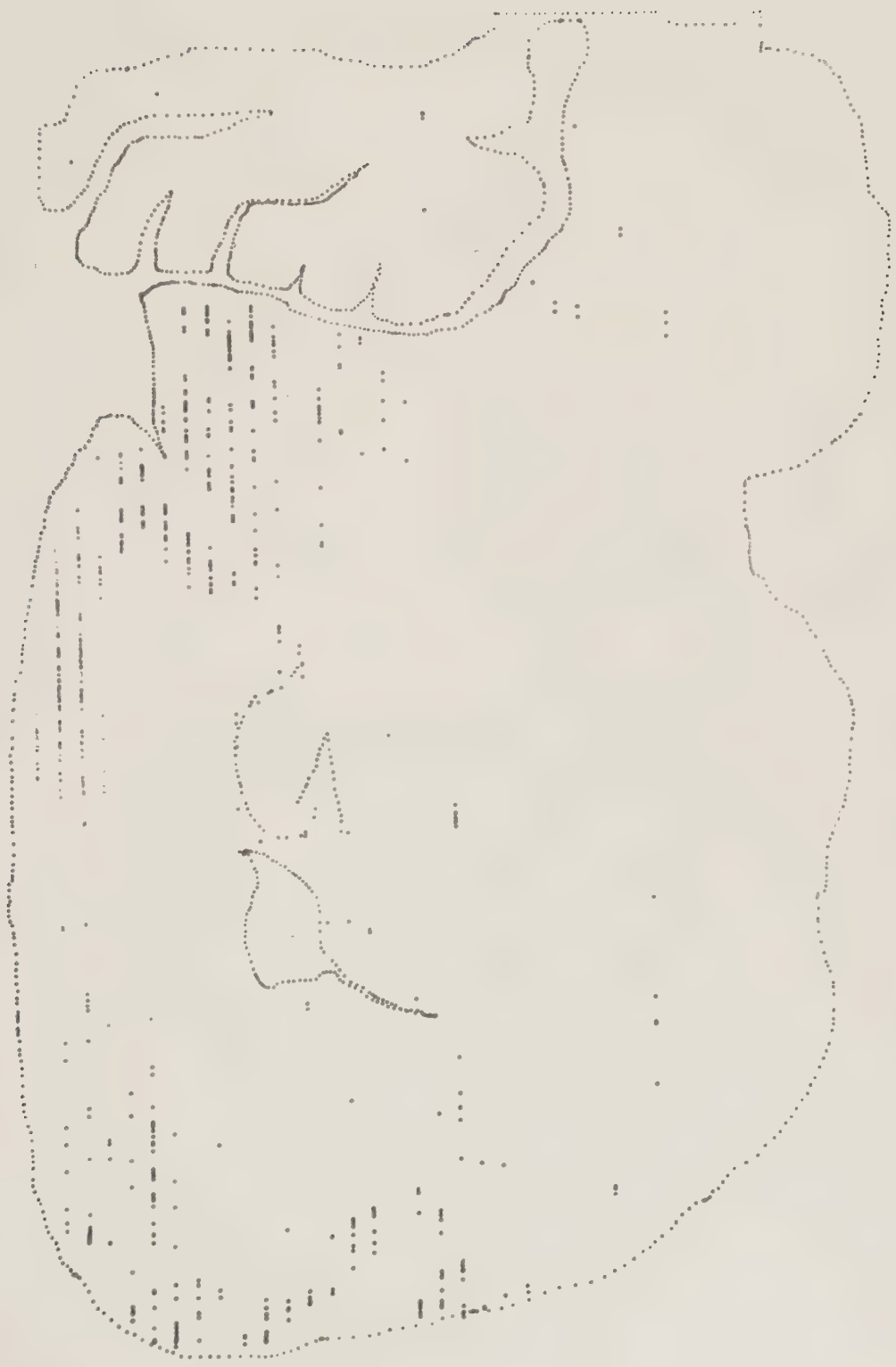
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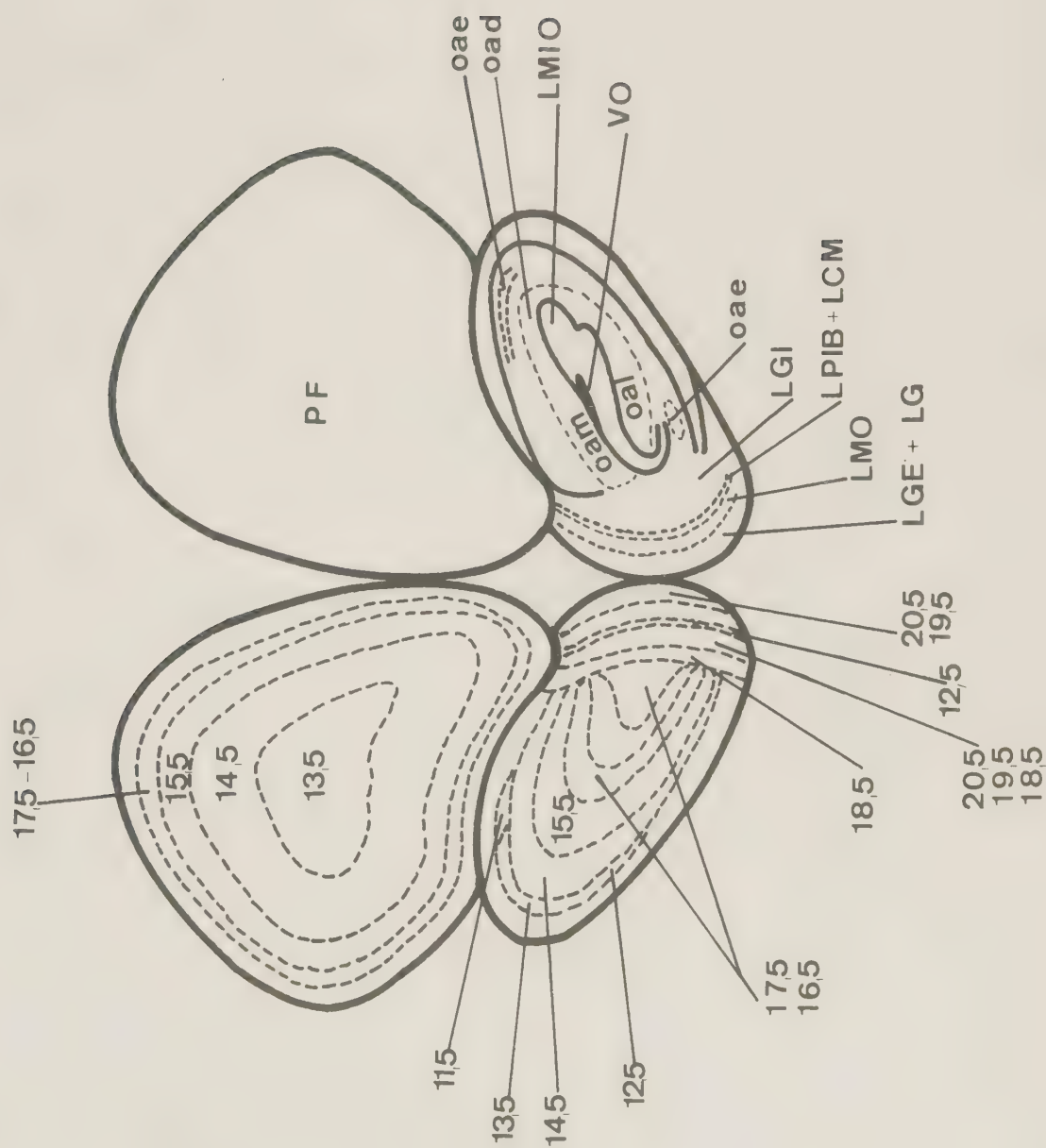
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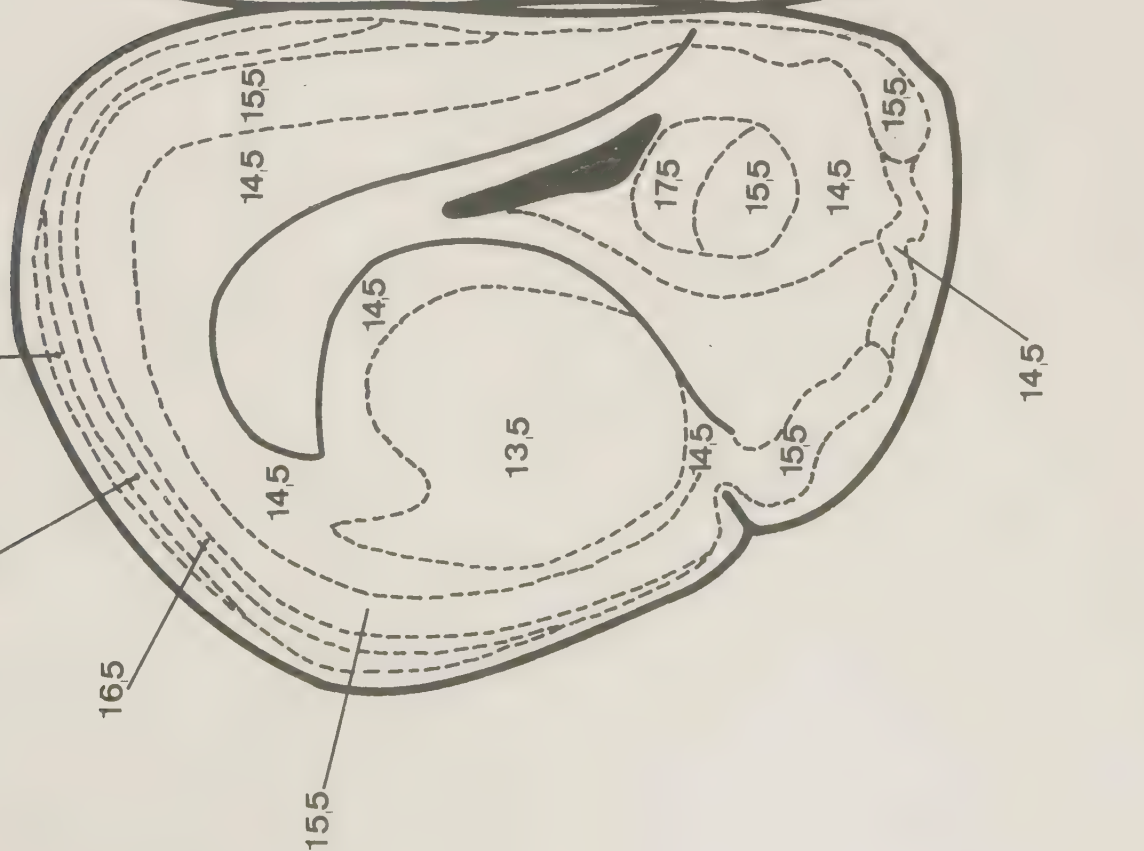


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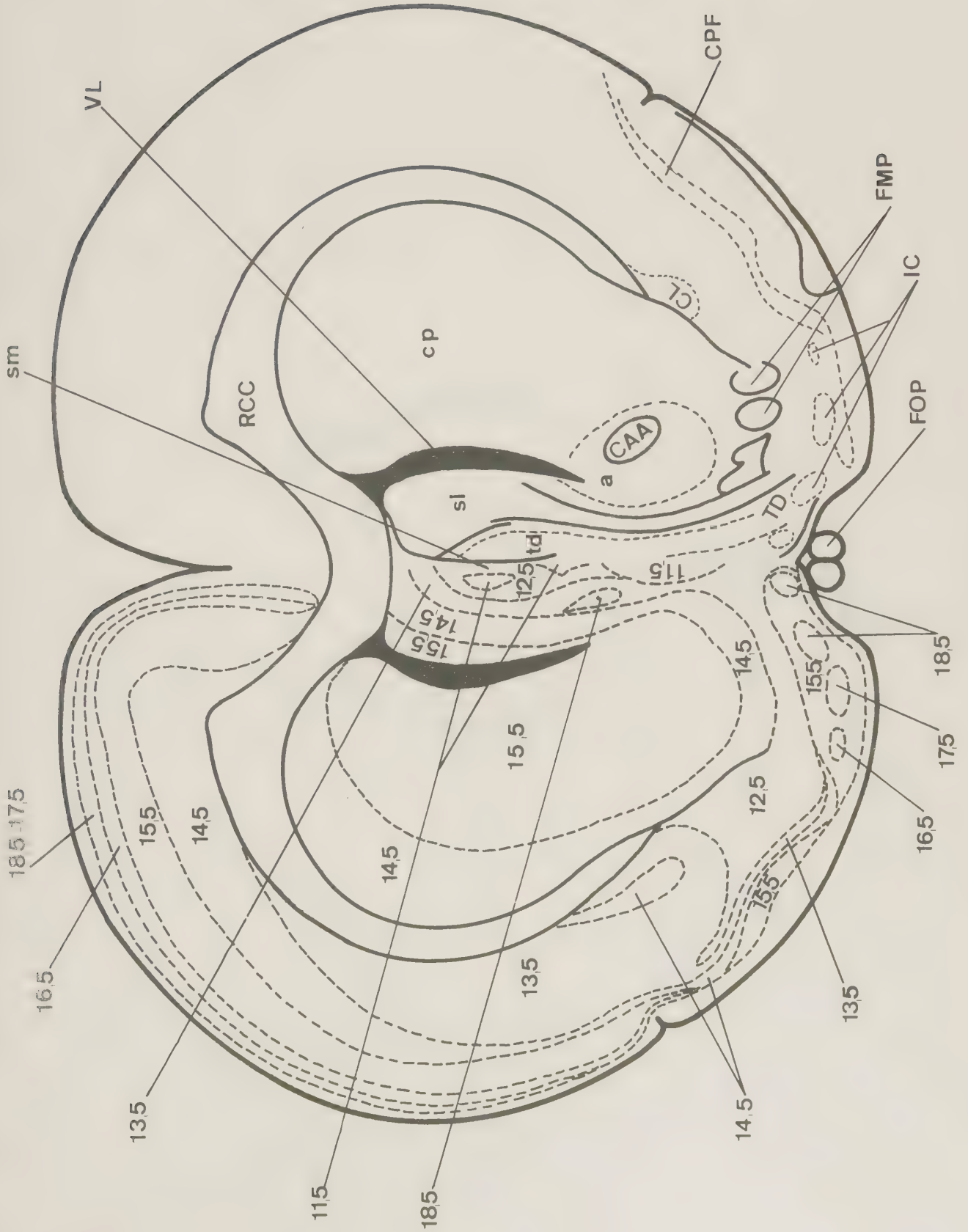
PL 88

NIVEAU I



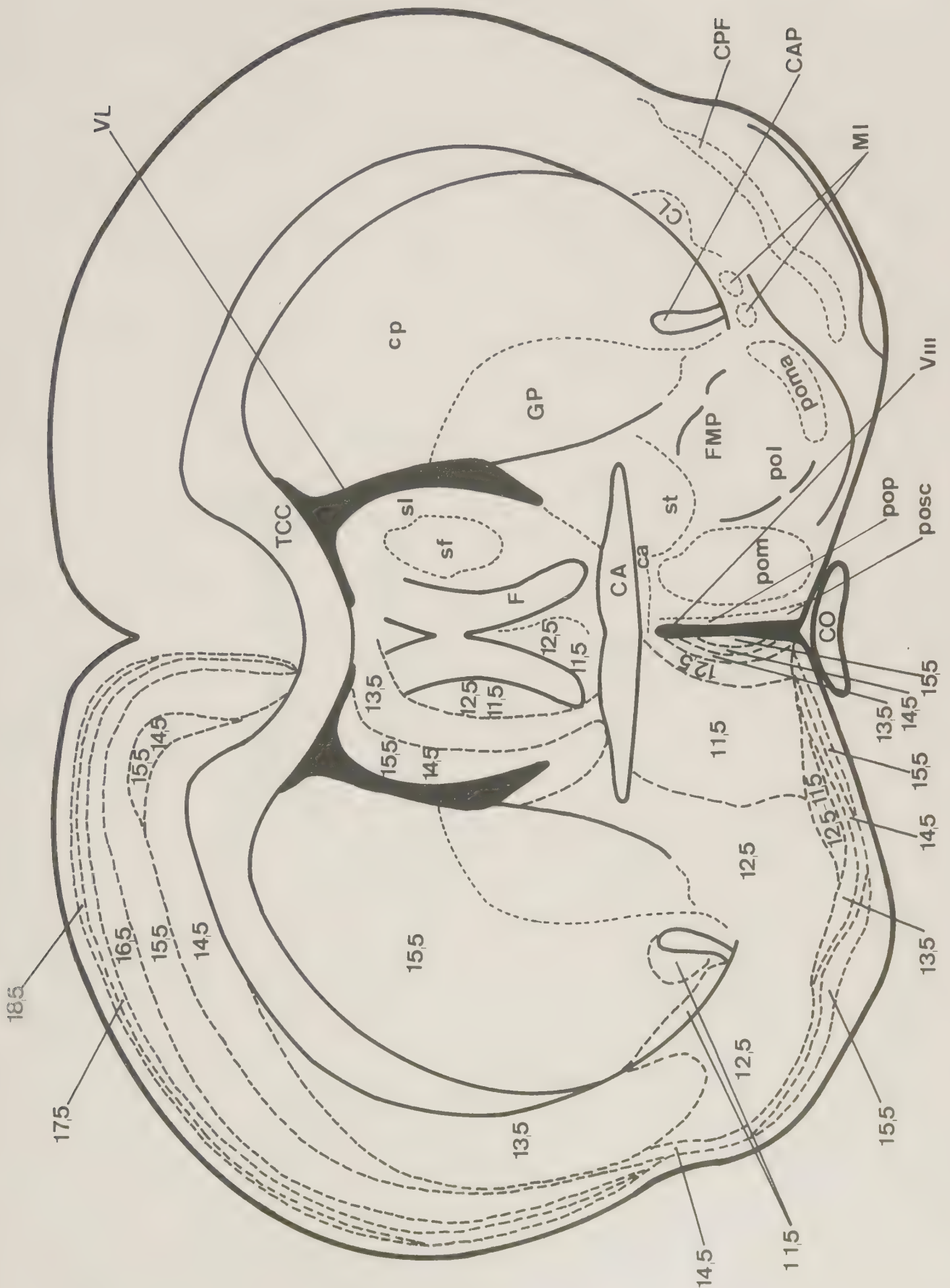


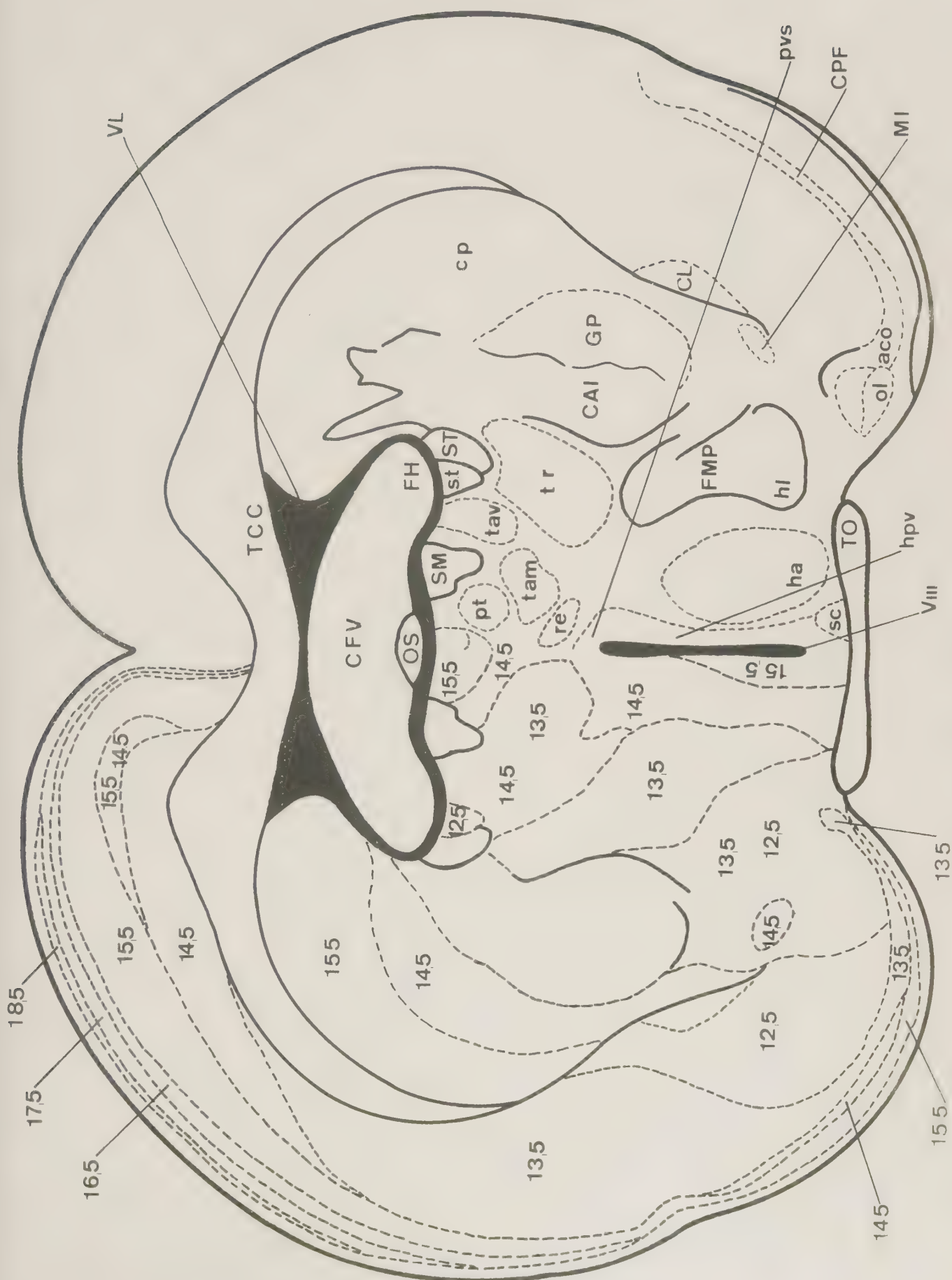
PL 90
NIVEAU III



PL 91

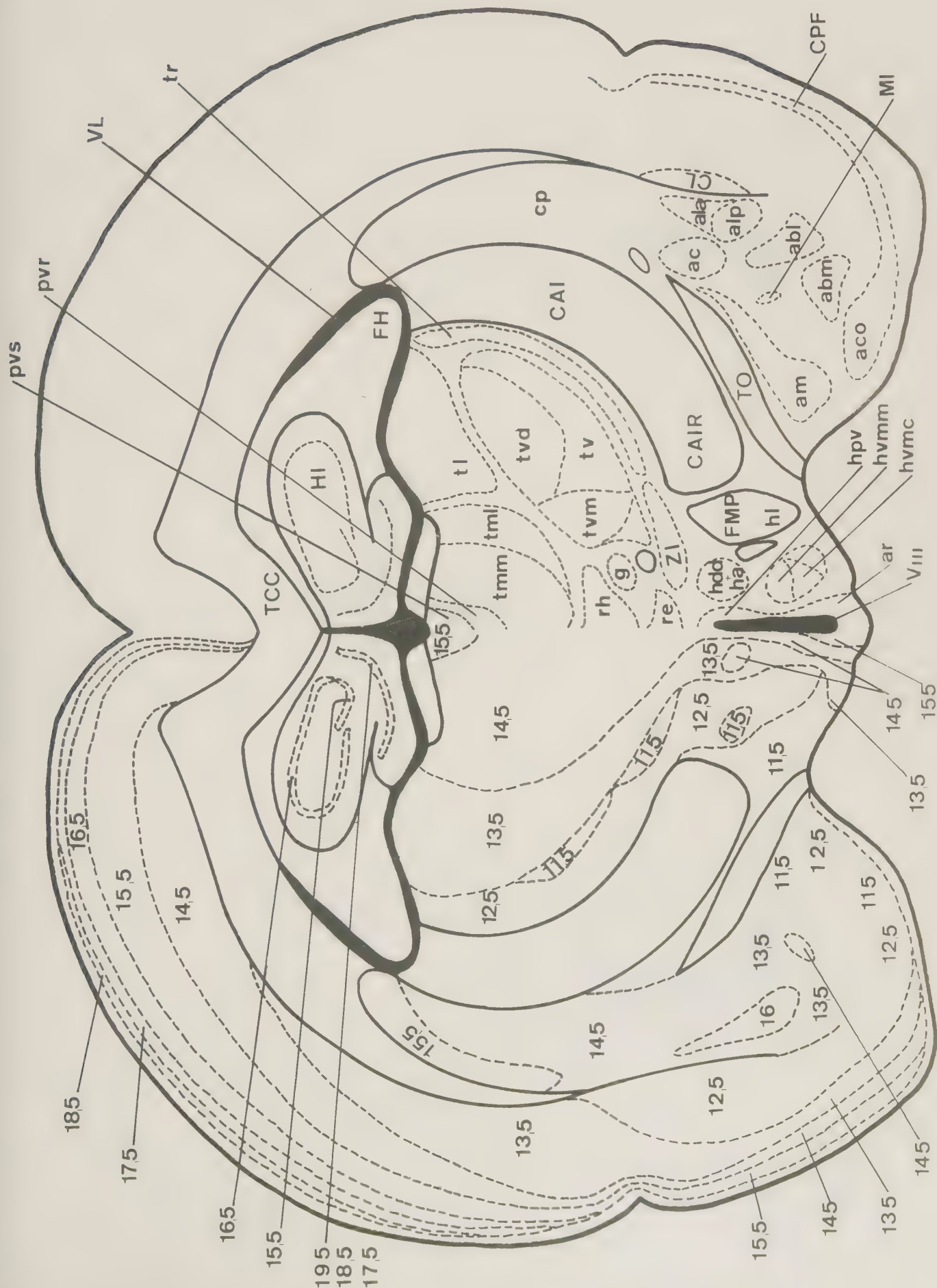
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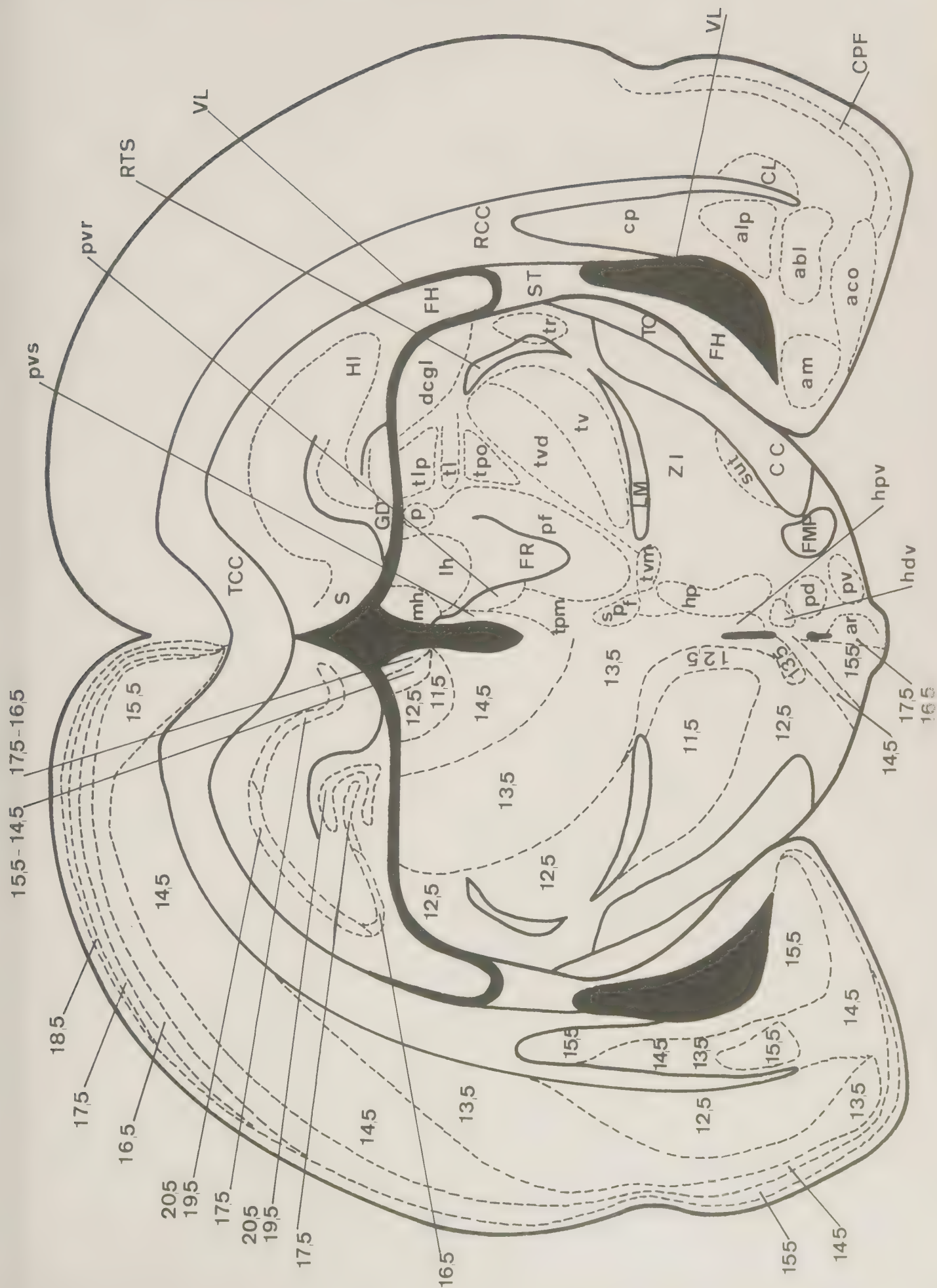


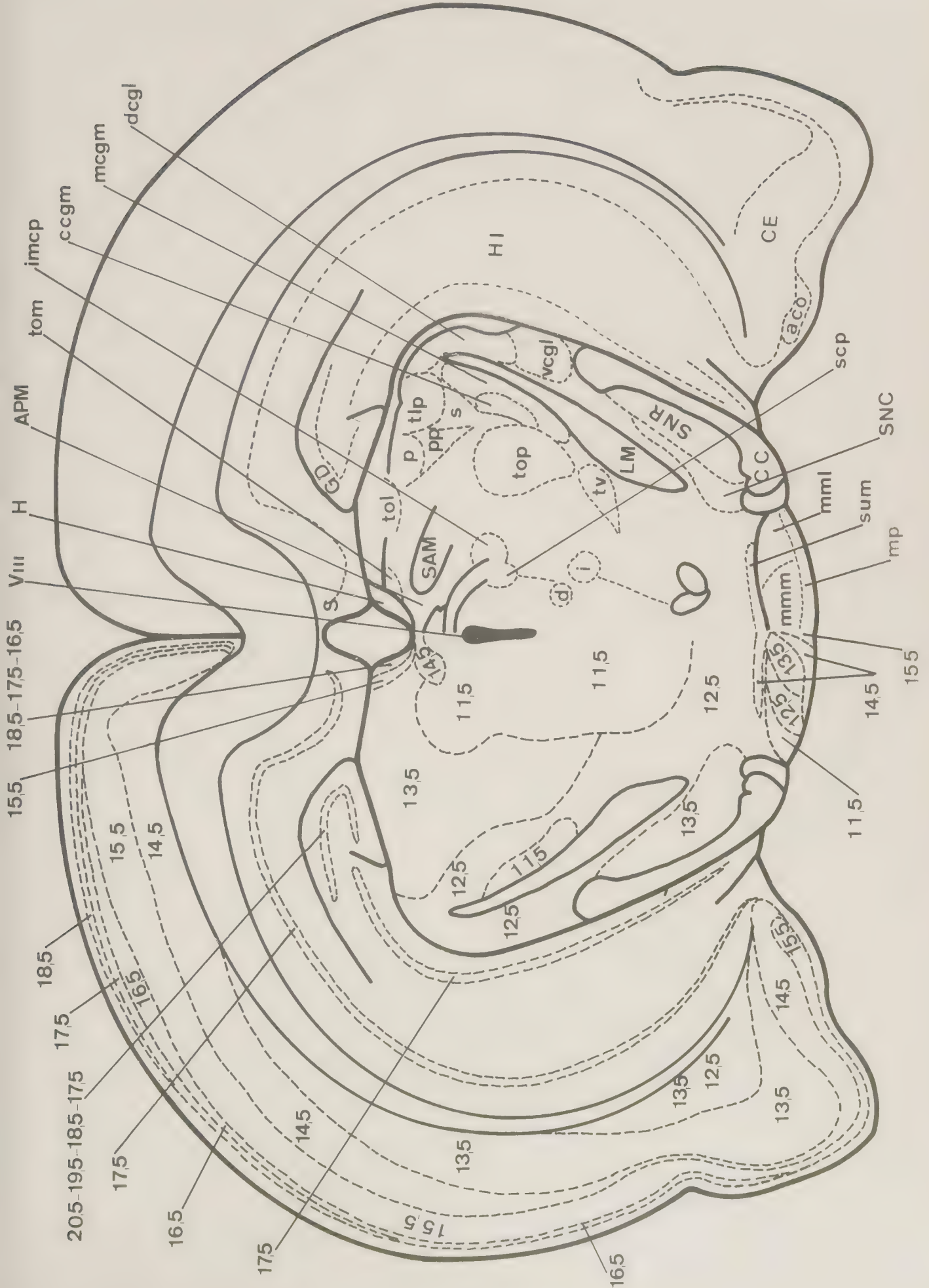


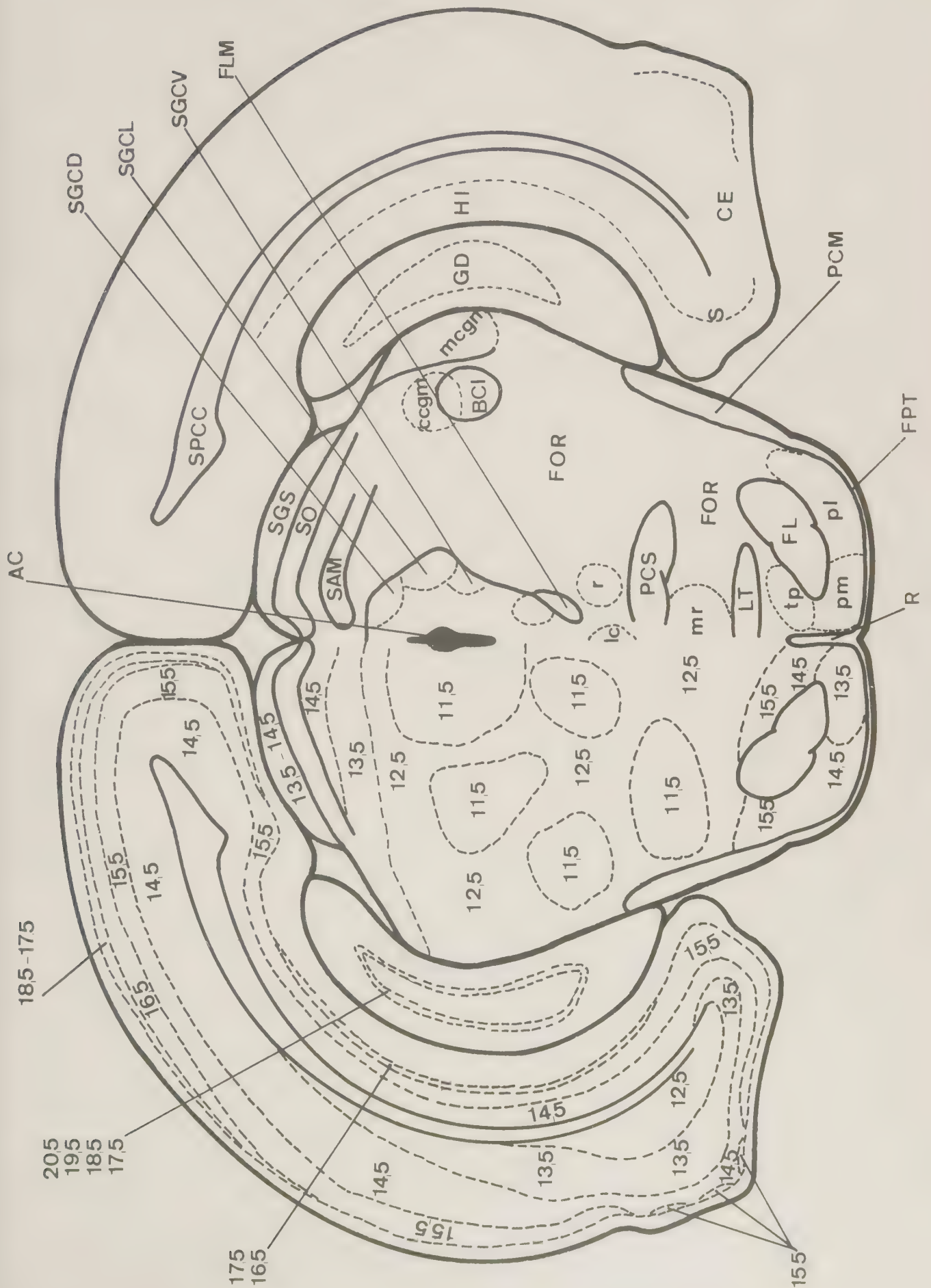
PL 93

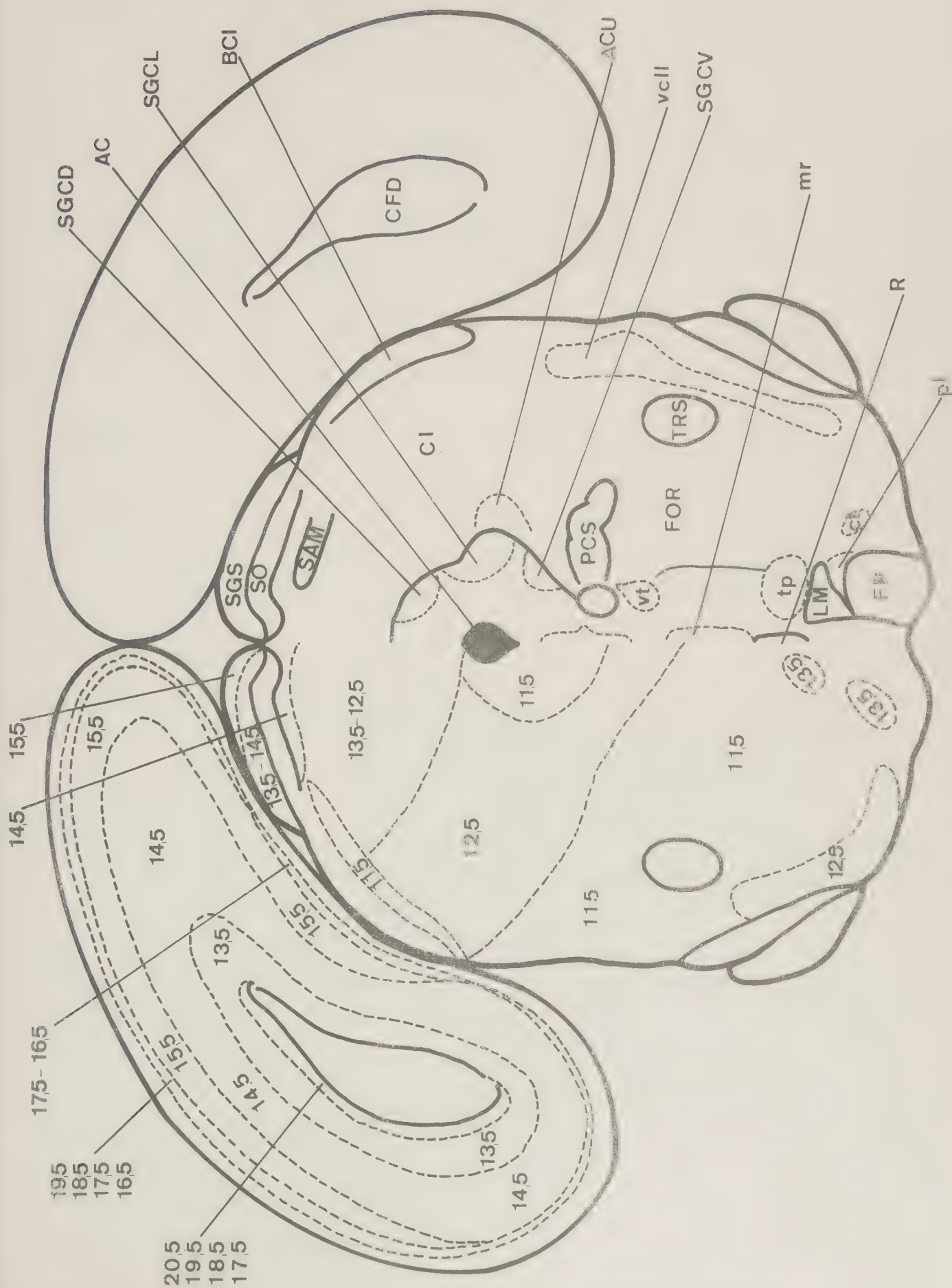
NIVEAU VI











B I B L I O G R A P H I E

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